C.F.T.R.I.
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

COMMERCIAL FISHERIES
ABSTRACTS

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

USE OF FUNDS FOR PRINTING THE ABSTRACTS WAS APPROVED BY THE DIRECTOR OF THE BUREAU OF THE BUDGET, APRIL 18, 1968

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

DIVISION OF PUBLICATIONS

Leslie W. Scattergood, Chief

EDITORIAL STAFF
COMMERCIAL FISHERIES ABSTRACTS

Frank T. Piskur	Editor
Lena Baldwin	Associate Editor
Gladys K. Chandler	Editorial Clerk
F. Bruce Sanford	Editorial Adviser
Maurice E. Stansby	Technical Adviser

Members of the fishing industry and allied interests who wish to receive COMMERCIAL FISHERIES ABSTRACTS should write to:

Bureau of Commercial Fisheries
Division of Publications
Bldg. 67, U.S. Naval Air Station
Seattle, Washington 98115

A description of the numbering system is contained in FISHERY LEAFLET No. 232: "FISHERY TECHNOLOGICAL ABSTRACT CARD SYSTEM," by Maurice E. Stansby, K. L. Osterhaug, and F. Bruce Sanford. The Leaflet is obtainable free from this Bureau.

To use the abstracts fully, the reader should cut along the lines dividing them and file them by the number in the upper left-hand corner.

The Bureau assumes no responsibility for accuracy of material from outside sources and can fulfill requests for copies of articles only if the abstract were taken from a Bureau publication. Requests for reprints should be directed to the author of the article or to the journal in which it was published. Addresses of these journals appear in the back pages of COMMERCIAL FISHERIES ABSTRACTS about once a year.

Use of trade names in abstracts does not imply endorsement of commercial products.

0.3 APPLIED REACTION KINETICS. FUNDAMENTALS AND APPLICATIONS

Lin, K. H. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830)
Industrial and Engineering Chemistry 61, No. 3, 42-66 (March 1969)

This is the annual review of 1967-68 literature on fundamental kinetic studies; it also covers the less common reactions. The review contains the following categories:

Fundamental Studies--Experimental
- Experimental Techniques
  - Radioactive tracers
  - Resonance method
  - Spectroscopy
  - Emission intensity measurement
  - Differential thermal analysis
  - Polarography
  - Special purpose chemical reactors
  - Miscellaneous techniques
- Rate Data
- Kinetics and Mechanism--Inorganic Reactions
  - Hydrolysis, dissolution, and decomposition
  - Synthesis and miscellaneous reactions
  - Reactions involving a gas phase
  - Thermal decomposition

(over)

 ABSTRACTER: F. T. Piskur

0.3 APPLIED REACTION KINETICS. POLYMERIZATION REACTION KINETICS
(Cross Ref.: 0.2)

Lenz, Robert W. (Chemical Engineering, University of Massachusetts, Amherst)
Industrial and Engineering Chemistry 61, No. 3, 67-75 (March 1969)

This review covers publications on polymerization reaction kinetics that appeared from January 1967 to mid-1968. The organic polymerization reactions are classified into two major categories: step-growth polymerization and chain-growth polymerization. The various outline sections are:

- Step-Growth Polymerization
  - Polyesterification
  - Polyamidation
  - Polyurethane
- Homogeneous Chain-Growth Polymerization
  - Free-radical polymerization
  - Nonhomogeneous radical polymerization
  - Free-radical copolymerization
- Anionic Polymerization
- Cationic Polymerization
- Heterogeneous Chain-Growth Polymerization
  - Ziegler-Natta polymerization

[9 tables, 232 references]

 ABSTRACTER: F. T. Piskur

0.4 NITROSAMINE-INDUCED CARCINOGENESIS -- THE ALKYLATION OF NUCLEIC ACIDS OF THE RAT BY N-METHYL-N-NITROSOUREA, DIMETHYLNITROSAMINE, DIMETHYL SULPHATE AND METHYL METHANESULPHONATE

Swann, P. F., and P. N. Magee (Medical Research Council Toxicology Research Unit, Carshalton, Surrey, England. Present address: Courtauld Institute of Biochemistry, The Middlesex Hospital Medical School, London, W.1, England)
Biochemical Journal 110, No. 1, 39-47 (November 1968)

Several investigators have surveyed the carcinogenic properties of a number of N-nitroso compounds during the past few years. They have found that a single dose of the simplest of these compounds, dimethylnitrosamine, although completely metabolized within 5 or 6 hours of ingestion, can produce kidney tumors in the rat. During this time, the compound is converted in vivo into an active methylating agent that reacts with proteins to form methylated histidine residues and with nucleic acids to form mainly 7-methylguanine. Other carcinogenic N-nitrose compounds also produce alkylation of guanine at N-7.

Since publication of these findings, several hypotheses have been advanced about the role that alkylation of cellular components plays in the toxicity and the carcinogenic potency of the nitrosamines. In 1962, Heath concluded that alkylation of some cellular component, not some other possible chemical reaction,

(over)

 ABSTRACTER: L. Baldwin

0.4 THE RATE OF BREAKDOWN OF METHYL METHANESULPHONATE, DIMETHYL SULPHATE AND N-METHYL-N-NITROSOUREA IN THE RAT

Swann, P. F. (Medical Research Council Toxicology Research Unit, Carshalton, Surrey, England)
Biochemical Journal 110, No. 1, 49-52 (November 1968)

In an earlier paper, Swann and Magee (1968) compared the carcinogenic potency of two nitrosamines and two alkylating agents with the amount of alkylation produced in the rat by doses of the four compounds. Before this comparison could be made, however, the investigators had to know the approximate rate of decomposition of each of the compounds once it had been administered to rats. In 1962, Heath reported on the rate of metabolism of dimethylnitrosamine. The present paper reports on the lifetime of the other three compounds: dimethyl sulfate, methyl methanesulfonate, and N-methyl-N-nitrosourea.

The rate of breakdown of dimethyl sulfate was followed in vitro and in vivo with rats. Half-life of the compound was about 4.5 hr. Its concentration in the blood decreased rapidly following injection at the rate of 75 mg./kg. body weight; after 5 min., it was undetectable. Because methylation of the nucleic acids in the lungs and brain has been shown to be much higher than in the liver and the kidney, which receive a smaller proportion of the cardiac output, the author concludes that dimethyl sulfate does not equilibrate throughout the body; rather, it breaks down in the first organ it penetrates.

(over)

 ABSTRACTER: L. Baldwin

0.38 (Cross Reference: 7.591)

DEMONSTRATION OF ACID PHOSPHATASE ACTIVITY IN THE GRANULES OF THE BLOOD CELLS OF THE LOBSTER, HOMARUS AMERICANUS

Hearing, Vincent J. (Department of Biology, Catholic University of America, Washington, D.C. 20017)
Chesapeake Science 10, No. 1, 24-28 (March 1969)

The purpose of this study was to demonstrate the presence of the enzyme acid phosphatase in the granules found in the blood cells of the lobster, thus indicating that the granules are of lysosomic nature. The activity of the enzyme was demonstrated in the granules of all three types of blood cells--the eosinophil, the ovoid basophil, and the spindular basophil.
[8 figures, 5 references] [Abstracter: F. T. Piskur]

0.3 (Cross Reference: 0.2)

Kinetics and Mechanism--Organic Reactions
- Synthesis, formation, and miscellaneous reactions
- Esterification and reactions of esters
- Oxidation
- Pyrolysis
- Reactions with minerals

Fundamental Studies--Theoretical
- General
- Techniques for Determination of Kinetic Parameters
- Reaction Analysis
- Interaction of Physical and Chemical Processes

Less Common Reactions
- Fast and High Temperature Reactions
- Reactions Under Influence of Ultrasonic and Shock Waves
- Reactions in Plasmas and Electric Discharges
- Radiation-Induced Reactions

Pilot-Plant and Commercial-Scale Studies

[8 tables, 431 references]

0.4 (Cross References: 0.32, 0.39)

Methyl methanesulfonate, injected at the rate of 100 mg./kg. body weight, disappeared from the rats' blood in about 1.5 hr. Following injection of [^{14}C] methyl methanesulfonate, the rats exhaled $^{14}CO_2$ rapidly for about 16 hr. The rate of $^{14}CO_2$ exhalation was still appreciable 30 hr. after the injection. About 20 percent of the ^{14}C was excreted in the urine. The discrepancy between the rapid decrease in the concentration of methyl methanesulfonate in the blood and the rats' continued exhalation of $^{14}CO_2$ suggested to the author that the rapidly metabolized compound leaves a number of metabolites that are either excreted or further metabolized. The continuing exhalation of $^{14}CO_2$, then, could represent the result of secondary rather than primary metabolism.

N-methyl-N-nitrosourea injected at the rate of 100 mg./kg. body weight broke down in about 15 min. Following an intravenous injection of N[^{14}C]-methyl-N-nitrosourea (90 mg./kg. body weight), most of the $^{14}CO_2$ was exhaled within 4 hr. After an intragastric dose of the same amount, the $^{14}CO_2$ was exhaled much more slowly. The amount of ^{14}C excreted in the urine following intravenous injection was about 7 percent; following the intragastric dose, it was about half that. Because methylation of the nucleic acids, not only of the gastrointestinal tract but also of the organs, has been shown to be considerable, the author concludes that intragastrically administered N-methyl-N-nitrosourea is not immediately broken down but is mainly absorbed unchanged into the bloodstream.
[1 table, 5 figures, 11 references]

0.4 (Cross References: 0.32, 0.39)

causes the acute toxicity of these compounds. Later, several authors suggested that the early inhibition of hepatic protein synthesis in acute dimethylnitrosamine poisoning may be caused by methylation of messenger ribonucleic acid (RNA). The biochemical lesion that starts the carcinogenic process, however, is still undefined. Considerable circumstantial evidence points to the production of an active carcinogen during the breakdown of the nitrosamine, since as a rule only those nitroso compounds that break down spontaneously--for example, N-methyl-N-nitrosourea--or that may be broken down enzymically--for example, dimethylnitrosamine--are carcinogenic. Although alkylation may not be the only chemical reaction that occurs as a result of the breakdown, the authors assumed, for the purpose of the experiments reported here, that alkylation of some cellular constituent causes the carcinogenic action of the nitrosamines. They divided the experiments into two parts. In this first part, they investigated (1) the methylation of the guanine produced in the nucleic acids of the organs of rats injected with a single dose of one of two N-methylnitrosamines or with a single dose of one of two methylating agents and (2) the carcinogenic activity of each of the compounds. Their purpose was to discover whether there is a correlation between the two.

All four of the compounds produced 7-methylguanine in the nucleic acids of the rats. A table is given showing the amount of 7-methylguanine (expressed as a percentage of the total guanine) produced in the RNA and the deoxyribonucleic acid of the liver, kidney, lung, small intestines, large intestine, stomach, testis, and brain of the experimental animals by injection of each of the compounds. The data show appreciable correlation between the amounts of alkylation of nucleic acids in a tissue and the distribution of the tumors produced.
[3 figures, 3 tables, 48 references]

0.6 MARINE PROTEINS

Roels, Oswald A. (Marine Biology Division, Lamont Geological Observatory, Columbia University, Palisades, New York 10964)
Nutrition Reviews 27, No. 2, 35-39 (February 1969)

The food chain that links fish to birds to guano to corn field to pigs to man is inefficient, for it yields only 1 lb. of human protein for every one million pounds of fish. When two of the links are removed, leaving a fish-to-fishmeal-to-pigs-to-man progression, efficiency is improved a thousandfold. And when man eats the fish directly, efficiency is improved another fiftyfold. Although direct consumption of fish is unquestionably the most efficient way of utilizing the protein, it is not always the feasible way. Thus the food technologists' goal is to provide the protein in a practical form and with as many as possible of the intervening links between man and the protein source removed. This goal would lead to a fish-to-fishmeal-to-man food chain. Not only would the utilization of protein be more efficient, but the price to the consumer would be markedly less--if fishmeal could be used directly by humans, the price would be about 7¢ a pound; fish protein concentrate is now about 42¢ a pound.

The author traces methods of making fish protein concentrate, mentioning the types of fish used for the product, and discusses research now being conducted to improve fishmeal by reducing fattiness, removing grittiness, and increasing

(over)

 ABSTRACTER: L. Baldwin

0.7 THE EFFECTS OF INTRAVENOUS INFUSIONS OF COD-LIVER AND SOYA-BEAN OILS ON THE SECRETION OF MILK FAT IN THE COW

Storry, J. E., A. J. Hall, B. Tuckley, and D. Millard (National Institute for Research in Dairying, Shinfield, Reading, England)
British Journal of Nutrition 23, No. 1, 173-180 (March 1969)

Previous work has established that feeding cod-liver oil to dairy cows reduces the content and yield of fat in milk; however, the factors responsible are not known. The purpose of the present experiments was to determine the effects of intravenous infusions of emulsified cod-liver oil, of ethyl ester fractions of cod-liver oil rich in polyunsaturated acids (trade name is Ethive), and of soya-bean oil on the secretion of milk fat and the composition of blood lipids in dairy cows.

Lactating Friesian cows receiving a diet of hay and concentrates balanced for milk production were given continuous intravenous infusions of soya-bean oil or cod-liver oil emulsions. The emulsions of cod-liver oil and Ethive were given for 3 days at a daily rate of 400 g. The soya-bean oil emulsion was infused for 2 days at a daily rate of 500 g. of oil. The infusion periods were preceeded by and followed by 2- and 6-day control periods, respectively.

Soya-bean oil increased the yield of fat by increasing the secretion of unsaturated C_{18} acids in the milk. It also increased the proportions of oleic and

(over)

 ABSTRACTER: F. T. Piskur

0.7 NUTRITION AND LYSOSOMAL ACTIVITY. THE EFFECT OF DIETARY COD-LIVER OIL ON THE DISTRIBUTION OF POLYUNSATURATED FATTY ACIDS IN THE KIDNEY LYSOSOMES OF RATS RECEIVING DEFICIENT OR ADEQUATE INTAKES OF VITAMIN E

Iqbal, M., J. T. Dingle, and T. Moore (Strangeways Research Laboratory, Cambridge, England); and I. M. Sharman (Dunn Nutritional Laboratory, University of Cambridge and Medical Research Council, England)
British Journal of Nutrition 23, No. 1, 31-39 (March 1969)

Studies were made, using gas chromatography, of the effect of incorporation of polyunsaturated fatty acids (PUFA) into the kidney lysosomes of rats. The purpose was to explain the antagonism between the PUFA and vitamin E in the promotion of postmortem autolysis and increased lysosomal fragility in the kidney of rats. Kidneys were taken from rats that had received various diets containing different fat components and with or without vitamin E. The effect of cod-liver oil on the PUFA distribution in the lysosomes was specially studied because diets containing this oil reduce the period of dietary preparation necessary for rapid kidney autolysis.

The purified preparations of kidney lysosomes from rats that had received substantial amounts of cod-liver oil for several weeks showed that the $C_{22:5}$ acid was incorporated mainly at the expense of $C_{18:2}$ (linoleic) and $C_{20:4}$ arachidonic)

(over)

 ABSTRACTER: F. T. Piskur

0.8 A ROTATING HYDROSTATIC HELIX FOR TRANSFERRING SOLID-LIQUID MIXTURES UNDER PRESSURE OR VACUUM

Farkas, D. F., M. E. Lazar, and W. C. Rockwell (Western Utilization Research and Development Division, Agricultural Research Service, U.S. Department of Agriculture, Albany, California 94710)
Food Technology 23, No. 4, 180-182 (April 1969)

This paper describes a helical pump for transferring either packaged or unpackaged foods into processing chambers that are under pressure or vacuum. The pump consists of a plastic coil (2-inch internal diameter) of 11 turns mounted on a drum 2.5 ft. in diameter. The drum rotates on a horizontal axis and at controlled speeds. The helical pump coil is connected to a pressure vessel through a rotary joint. As the drum rotates at 5 r.p.m., equal volumes of air and water are introduced into the coil. In this manner, a series of hydrostatic heads are formed so that the helical pump operates with many short water columns divided by columns of gas.

This paper introduces the helical pump concept, but many design variables must still be studied, such as (1) helix diameter, (2) methods of feed introduction, and (3) relative speeds of rotation of feed and discharge pump and auxiliary air supplies.

(over)

 ABSTRACTER: F. T. Piskur

0.7 (Cross References: 4.9, 5.7)

acids. In lysosomal fractions that were less purified, the incorporation of $C_{20:5}$ and $C_{22:6}$ acids and the corresponding reductions in linoleic and arachidonic acids were well advanced after 10 days, and were maximal in about 30 days. The reverse changes took place with about the same rapidity when rats that were previously fed cod-liver oil were given a diet containing lard. The PUFA content of the kidney lysosomes of rats not given vitamin E was not significantly different from that of rats given adequate doses of vitamin E.

The increase in the tendency to autolysis of the kidney and the reduction of the stability of the lysosomes caused by the feeding of cod-liver oil were associated with the partial replacement of linoleic acid and of the endogenous arachidonic acid by an acid that is usually foreign to the rat and that is even more unsaturated. Inasmuch as vitamin E did not prevent the entry of this particular acid into the lysosomes, its potency in retarding autolysis and in stabilizing the lysosomes must be exerted at some point subsequent to the incorporation of PUFA.

Apparently lysosomal lipids escape usage in general metabolism as an intermediate source of calories and have a half-life of at least 15 days. However, individual fatty acids may have different half-lives.
[2 figures, 3 tables, 7 references]

0.6 (Cross References: 0.32, 6.37, 6.54)

the protein content and the flavor. He describes the preparation of fish protein hydrolyzates by chemical and enzymic methods and by fermentation with lipolytic microorganisms. He also reviews the potential of farming algae, fish, and shellfish, touching on the use of cold, deep sea water as fertilizer in closed-off lagoons to increase the primary production of the marine food chain.
[9 internal references]

0.6 (Cross Reference: 6.54)

EMULSION COLOR DEVELOPMENT

U.S. Patent 3,413,126
Meusel, J. A., and R. A. Brunn
Food Technology 23, No. 4, 148 (April 1969)

Fumaric acid is used for short-time development of color in emulsions of frankfurter meat.

0.8 (Cross References: 2.3, 3.336)

Some possible applications may be (1) in pumping whole fruits, vegetables, dumplings, and other soft whole foods whose identity must be maintained and (2) in transferring packages (flexible pouches, cans, and other small containers) through processing steps. [6 figures]

[Abstracter: F. T. Pisker]
[10 references]

by adequate processing, good sanitation, and proper refrigeration.

There are three types of food poisoning. Any of the three types of food poisoning can be controlled by these organisms. Clostridium perfringens food poisoning is also discussed, but there is no evidence that incrimination available on the exact cause of food poisoning from fermentation of foods by microorganisms--staphylococcal food poisoning and botulism. Clostridium perfringens food poisoning results from the consumption of meat and poultry products on the market, the potentially high cost to industry and to consumer of entering objectionable products on the market, and establishment of the National Institute of Environmental Health Sciences, U.S. Public Health Service, Research Triangle Park, Durham, North Carolina 27706), pp. 132-135.

2. Bacterial Toxins in Food, by Merlin S. Bergdoll (Department of Food Sciences, University of Wisconsin, Madison 53706), pp. 132-135.

Food Technology 23, No. 4, 130-135 ff. (April 1969)

Payne, William W.; et al.:

1. Microbial and Chemical Hazards in Foods, by William W. Payne, and Paul Korn (Division of Environmental Health Sciences, U.S. Public Health Service, Research Triangle Park, Durham, North Carolina 27706), pp. 130-131. The authors discuss the cumulative nature of hazards from foods, the potentially high cost to industry and to consumer of entering objectionable products on the market, and establishment of the National Institute of Environmental Health Sciences.

0.7 (Cross References: 4.9)

linoleic acid in the triglycerides of the blood plasma. Cod-liver oil and Ethive decreased the yield of total fat and the yields of C_{14} to C_{18} acids and had no effect on the yields of C_4 to C_{12} acids in milk. The C_{20} to C_{22} acids were incorporated into the triglycerides of the blood plasma; however, they were not secreted in the milk fat.

The authors conclude that if the polyunsaturated C_{20} and C_{22} acids in cod-liver oil are not hydrogenated in the rumen before their absorption from the digestive tract, they can act directly on the mammary gland, possibly through the inhibition of lipoprotein lipase, to reduce the secretion of long-chain acids in milk. Further, cod-liver oil may have an indirect effect on the secretion of short-chain acids in milk through a change in the production of volatile fatty acids in the rumen. [4 tables, 13 references]

0.39 (Cross References: 0.6, 8.0)

RELATIONSHIP BETWEEN MUSCLE BIOCHEMISTRY AND PROPERTIES OF FRESH AND PROCESSED MEATS

McLoughlin, J. V. (Meat Research Department, The Agricultural Institute, Castleknock, County Dublin, Ireland)
Food Manufacture 44, No. 1, 36-40 (January 1969)

Since the physical and biochemical properties of fresh meat markedly influence the way in which the raw material responds to processing, a knowledge of these properties allows not only prediction of the quality of the product but selection of raw materials that are best suited to particular types of processing. Moreover, it makes possible some control of such properties as waterholding capacity, color and texture. The relation between the live animal, post-mortem glycolysis and these properties in fresh beef and pork is discussed. [69 references]

[Abstracter: L. Baldwin]

1.12 TUNA SCHOOLING TERMINOLOGY

Scott, James Michael (Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Fishery-Oceanography Center, La Jolla, California 92037)
California Fish and Game 55, No. 2, 136-140 (April 1969)

Because purse-seine fishermen of the California tuna fleet use a wide variety of terms to identify different types of tuna schools, the efforts of regulatory agencies to evaluate catchability in terms of schooling characteristics are complicated immeasurably. In this report, the terms used by the fishermen are recorded, defined, and categorized on the basis of the depth of the school, the time of day or night the school is sighted, and association of the school with other fish or with floating objects.

School fish
Surface (those that create a physical disturbance at the surface of the water)
Breezer; Finner; Jumper; and Boiler, foamer, smoker, or meat ball.

Subsurface (those that are located deeper in the water and do not disturb the surface)
Black spot, dark spot, brown spot, green spot, or black ball; and Shiner.

(over)

 ABSTRACTER: F. T. Piskur

1.120 MIGRATIONS DU GERMON EN FONCTION DES VARIATIONS THERMIQUES DU MILIEU ENTRE LE SECTEUR PORTUGAIS ET LE SO DE L'IRLANDE. CAMPAGNES DE "LA PELAGIA" ET DE LA "THALASSA" DU 18 MAI AU 30 SEPTEMBRE 1968
[MIGRATIONS OF ALBACORE AS A FUNCTION OF THERMAL VARIATIONS IN THE ENVIRONMENT BETWEEN THE PORTUGUESE SECTOR AND THE SOUTHWEST OF IRELAND. VOYAGES OF THE PELAGIA AND THE THALASSA FROM MAY 18 TO SEPTEMBER 30, 1968]

Allain, Ch., and H. Aloncle
Science et Pêche, No. 176, 15 pp. (December 1968) (Institut Scientifique et Technique des Pêches Maritimes, 59, avenue Raymond-Poincaré, Paris 16, France) (In French)

The authors' principal goal was to study the distribution and the migrations of albacore (Thunnus alalunga) from spring to the beginning of autumn and to make observations of bluefin tuna (Thunnus thynnus) and other tuna species that might be encountered. The principal other species observed was the skipjack (Katsuwonus pelamis). Two voyages were made. The first, made by The Pelagia from May 18 through July 5, had two objectives: to survey bluefin along the Iberian coast from Saint-Jean-de-Luz (43°23' N., 1°39' W.) to about the latitude of Lisbon (38° 44' N.) during the second fortnight in May; and to study the distribution of albacore as a function of hydrological conditions all along the Portuguese coast, following the albacore in its migration toward the north as far as the northwest tip of Spain. The goals of the second voyage, made by Thalassa and The Pelagia working jointly from August 19 through September 30, were to locate the northern

(over)

 ABSTRACTER: L. Baldwin

2.118 RAPID FREEZING OF TUNA BY IMMERSION IN DICHLORODIFLUOROMETHANE

Crawford, Ladell, and Roland Finch (Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Technological Laboratory, Terminal Island, California); and John J. Daly, Jr. (E. I. Du Pont Nemours & Company, Inc., "Freon" Products Division, Wilmington, Delaware)
Food Technology 23, No. 4, 151-155 (April 1969)

For reasons of economy, ease of operation, and high capacity, the brine freezing system has been used by tuna fishermen for over 30 years. However, it has certain disadvantages--slow freezing rate, relatively high holding temperatures, and possible excessive salt penetration into the fish. The purpose of the present study was to develop improved methods of freezing tuna aboard ship and the paper reports on experiments using dichlorodifluoromethane.

Yellowfin, bluefin, and skipjack tuna were frozen at sea by immersion in liquid dichlorodifluoromethane (trade name is Freezant 12). The rate of freezing and the amount of freezant carried over in the final product was determined. Also, comparisons were made of the quality of the canned fish prepared from the tuna frozen at sea by immersion in liquid dichlorodifluoromethane and by the present commercial method of immersion in refrigerated brine. Taste panel evaluations indicated that freezing the tuna in dichlorodifluromethane gave canned products that were generally somewhat better in quality than products prepared

(over)

 ABSTRACTER: F. T. Piskur

1.84 METHODS DEVELOPED TO HANDLE CALICO SCALLOPS

Robinson, Peg, and John Frye
National Fisherman 49, No. 12, 18B (March 1969)

BCF To Help Private Firms Exploit Beds, by Peg Robinson. The calico scallop (Aequipecten gibbus) is closely related, both generically and nutritionally, to the bay scallop (Pecten irradians), which has long been treasured as a delicacy by connoisseurs of seafood. People who have tasted the newly available calico scallop assert that it is as delicious as the smaller bay scallop. (The difference in meat size is due to the calico scallop's unusually large adductor muscle. Bureau of Commercial Fisheries scientists are intensifying their efforts to learn more about all aspects of this seafood resource, which is found from Cape Kennedy to St. Lucie Inlet, on Florida's east coast, and in the Gulf of Mexico. Their hope is that within 5 years the fishery will produce 15,000,000 lb. of scallops worth $20,000,000; eventually, they believe, it could contribute as much as $250,000,000 to the Gross National Product.

Break Comes by Automating New Vessels, by John Frye. The 1,200-square-mile beds or calico scallops off Florida's east coast lie 20 to 25 miles offshore in 90 to 180 feet of water. Thus they are beyond the reach of conventional scallopers. Early this year, two 86-foot vessels especially designed for this fishery, were launched in an attempt, the technology-oriented owners of the vessels

(over)

 ABSTRACTER: L. Baldwin

2.118 (Cross References: 3.2342, 3.331)

from tuna frozen in brine. However, certain quality defects, such as presence of blood streaks and of scorch (discoloration) were more predominant in the canned product prepared from the tuna frozen in Freezant 12. Dichlorodifluoromethane residues on the raw tuna ranged from 58 to 1,450 p.p.m.--the cut surfaces contained the higher concentrations of the freezant. The canned product contained from <1 to 14 p.p.m. of the freezant. [9 tables, 7 references]

1.84 (Cross References: 1.0116, 2.118, 2.12, 9.12)

say, to apply engineering and systems-management skills to a challenging problem in a traditional American industry. The vessels are equipped with tumbler dredges and automated shucking and eviscerating equipment. A consultant from the University of North Carolina developed packing and handling techniques.

The shucking equipment is located amidships, where the catch is dumped. It consists of a grader (which removes dead shells and trash), a conveyor (which takes the scallops to a primary impact roller), a concussion device (the roller, which separates the mantle from the shell), and a tank of 200° F. brine (which frees the adductor muscle and the viscera from the shell in a matter of seconds). The entire mass then moves to a shaker table, which separates the shells (which are dumped overboard) from the viscera and adductors (which drop to the eviscerating equipment on a lower deck). The eviscerating equipment consists of a set of slanted rollers that pull the viscera from the edible adductors. The adductors are stored in a 3.5 percent brine solution at 29° F. until the ship returns to port, as much as 10 days later.

The processing equipment is expected to average 100 lb. of scallops an hour, though it has double that capacity. The scallops will be packaged in 10-lb. plastic containers, which are less likely to compress the meats and cause the water loss that the usual 50-lb. cloth sacks cause. The two boats are expected to recover up to 15,000 lb. of scallops a trip the year round, or about 1,000,000 lb. annually. Bureau of Commercial Fisheries estimates place the sustainable yield of the beds being fished at 326,700,000 lb. of scallop meats a year.

2.117 TECHNICAL EDITOR COMMENTS ON READERS' LETTERS
RANGING FROM TRUNNELS TO FERRO-CEMENT

Gardner, John
National Fisherman 49, No. 12, 8A-9A (March 1969)

Among the wide range of subjects covered in this article is a brief review of a 59-page mimeographed paper that was written for presentation on March 1 at a meeting of the Pacific Northwest Section, Society of Naval Architects and Marine Engineers in Seattle, Washington. The paper, "Ferro-Cement, With Particular Reference to Marine Applications," is, according to the present author, an excellent introduction to ferro-cement. It has a comprehensive, though not exhaustive, bibliography. Copies of the report are available for $3.00 each from the author, Charles Darwin Canby, Department of Naval Architecture and Marine Engineering, University of Michigan, Ann Arbor, Michigan.

[Abstracter: L. Baldwin]

1.12 (Cross Reference: 9.3)

Night (those schools visible at night as a result of the activity of fish that causes luminescent planktonic organisms to emit flashes of light)
Fireball, ardura, glow, white spot, or flare; and
Popper.

Associated schools (those found with other fish or floating objects)
Fish and mammal associations
Porpoise schools
Spotters; Spinners; Spotters and spinners; and Whitebelly
Whale schools
Shark schools.

Inanimate object association
Log school
Bait boat.

1.120

limit of albacore at the end of August from the southwest of Ireland and Little Sole Bank to Saint-Jean-de-Luz; and to survey the concentrations of albacore as a function of hydrological conditions along the Iberian Peninsula during September. [5 figures]

1.122 (Cross Reference: 9.12)

BLUEFIN TUNA MIGRATE ACROSS THE PACIFIC OCEAN

Clemens, Harold B. (Marine Resources Operations, California Department of Fish and Game), and Glenn A. Flittner (Fishery-Oceanography Center, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service)
California Fish and Game 55, No. 2, 132-135 (April 1969)

Eight bluefin tuna, Thunnus thynnus (Linnaeus), tagged during the 1962-1964 fishing seasons and released in the California fishery were caught 2 or 3 years later off the coast of Japan (some 4,500 or 5,000 miles away). Two bluefins tagged in 1965 and released in the Japanese fishery were caught less than a year later off Baja California. The authors' investigations indicate that bluefin probably migrate regularly across the Pacific and that Japanese and American fishermen most likely harvest the same resource. [2 figures, 1 table, 4 references]

[Abstracter: L. Baldwin]

2.117 CONFERENCE ON FISHING VESSEL CONSTRUCTION MATERIALS
HULL--DECK--SUPERSTRUCTURE

Nelson, Richard I., et al.
Papers presented at conference on Fishing Vessel Construction Materials, October 1-3, 1968, Montreal, Canada (Conference sponsored by The Federal-Provincial Atlantic Fisheries Committee, Industrial Development Service, Department of Fisheries of Canada, Ottawa)

At the subject conference, the following papers were presented:

The Fishing Industry's Viewpoint on Vessel Construction Materials, by Richard I. Nelson, President, Fisheries Council of Canada. 4 pp., 1 reference.

The Potential of Newer Construction Materials, by G. Hughes-Adams, Ship Division, Marine and Rail Branch, Department of Industry, Ottawa, Canada. 6 pp., 1 table.

New Thinking on the Use of Materials in the Construction of Fishing Vessels, by Jan-Olof Traung and Øyvind Gulbrandsen, Fishery Resources and Exploitation Division, Food and Agriculture Organization, Rome, Italy. 10+ pp., 11 figures, 11 references.

A General View of Construction Materials of Fishing Vessels in Japan, By Seitaro Kojima, Fishing Boat Section, Fisheries Agency, Tokyo, Japan. 12 pp., 2 figures, 2 tables.

(over)

 ABSTRACTER: L. Baldwin

2.117 CONFERENCE ON FISHING VESSEL CONSTRUCTION MATERIALS
HULL--DECK--SUPERSTRUCTURE
(continued)

Design, Construction and Economic Considerations in Fiberglass Trawler Construction, by Boughton Cobb, Jr., Owens-Corning Fiberglass Corporation, New York. 25 pp., 2 photographs, 4 profile drawings, 6 references, 1 appendix.

Unsaturated Polyester Resins in Fishing Vessel Construction, by E. J. Frontini, Uniroyal Ltd., Elmira, Ontario, Canada. 9 pp.

Reinforced Plastic Fishing Vessels--An Atlantic Provinces Assessment and Future Outlook, by D. A. Eisenhauer, Atlantic Bridge Co., Ltd., Lunenburg, N.S., Canada. 21 pp.

Commercial Fishing Vessels in Glass Fibre Reinforced Plastics (Construction Techniques and Future Trends), by D. S. Pike, Goldharbour (Pty.) Ltd., Cape Town, South Africa; and Martin Yeatman, Yeatman, Endal & Co., Halifax, N.S., Canada. 40 pp., 2 tables, 1 reference.

Cored Fiberglass Reinforced Hull Construction, by K. B. Spaulding, Jr., Naval Ship Engineering Center, Washington, D.C. 61 pp., 24 figures, 20 references.

(over)

 ABSTRACTER: L. Baldwin

2.117 CONFERENCE ON FISHING VESSEL CONSTRUCTION MATERIALS
HULL--DECK--SUPERSTRUCTURE
(continued)

Wood as a Fishing Vessel Construction Material, by Walter J. McInnis and Howard I. Chappelle, U.S. Naval Architects. 18 pp., 1 table.

Construction Techniques for Wooden Fishing Vessels, by Stanley Potter, Potter and M'Arthur, Inc., Naval Architects, Marine Engineers, Surveyors, Boston, Massachusetts. 14 pp., internal references.

Nova Scotia Wood for Shipbuilding, by W. S. Hines, Marine & Engineering Services, Department of Fisheries of Nova Scotia, Canada. 6 pp.

Laminated Wood as a Fishing Vessel Construction Material, by E. E. Buswell, Laminated Timber Institute of Canada, Ottawa, Canada. 16 pp., 13 references.

Construction Techniques and Glues Used in Laminated Timbers in Fishing Vessels, by George W. Felszegi, Jos. A. Likely Limited, Saint John, N.B., Canada. 12 pp., 3 tables, 6 photographs, 7 references.

A Comparative Assessment and Future Outlook for Materials in Fishing Vessel Construction, With Particular Reference to Plywood, by John Brandlmayr, John Brandlmayr Ltd., Consulting Engineers and Naval Architects, Vancouver, B.C., Canada. 11 pp., 1 figure.

(over)

 ABSTRACTER: L. Baldwin

2.12 BOTTOM TRAWL EXPLORATIONS IN LAKE SUPERIOR, 1963-65

Reigle, Norman J., Jr. (Exploratory Fishing and Gear Research Base, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Ann Arbor, Michigan 48103)
U.S. Fish and Wildlife Service Circular 294, 25 pp. (January 1969)

Six exploratory fishing cruises, totaling 122 operating days, were made by the research vessel Kaho from November 1963 to October 1965. Most of the exploratory operations were in the central and eastern portions of the lake; however, limited surveys were made in the western area during 1965. This study is the first attempt to assess the potential for commercial bottom trawling in Lake Superior.

Suitable bottom for trawling was found along about 65 percent of the south shore. Over 74 percent of the total catch by the Kaho were chubs (Leucichthys spp.) followed by American smelt (Osmerus mordax), 10 percent; suckers (Catostomus spp.), 6.5 percent; and lake trout (Salvelinus namaycush), 3 percent. Commercially significant catches, 250 pounds per one-half hour, of chubs were taken on every cruise and these fish, even if used mainly for animal food products, could apparently support a limited trawl fishery. Smelt, suckers, and common whitefish (Coregonus clupeaformis) were caught occasionally in commercially significant quantities and could greatly supplement production efforts. Most lake trout were caught in specific geographic areas and appeared to be segregated by

(over)

 Authors' abstract

2.117

Plywood as a Construction Material for Fishing Vessels, by John Brandlmayr. 21 pp., 4 tables, 5 photographs, 2 references + internal references.

Steel Trends Related to Fishing Vessels, by W. A. Hopkins, The Steel Company of Canada, Limited. 9 pp., internal references.

Steel Fishing Vessels, by Robt. McArthur, Saint John Shipbuilding & Dry Dock Co., Ltd., Saint John, N.B., Canada. 9+ pp.

Shipbuilding with Aluminum, by Robert A. Campbell, Project Development Division, Aluminum Company of Canada, Limited, Montreal, Canada. 18+ pp., 14 figures, 3 tables.

Construction Techniques in Aluminum Fishing Vessels, by I. M. Matsumoto, Matsumoto Shipyards Limited, North Vancouver, B.C., Canada. 6 pp.

Aluminum as a Fishing Vessel Construction Material, by H. Svenkerud, Aluminum Company of Canada, Toronto, Canada. 23 pp., 3 figures, 6 tables, 4 references.

2.12 (Cross Reference: 1.0118)

size in specific depth zones. Abundant concentrations of small trout could easily be avoided after being located by fishing certain depths. With proper care, most trout were returned to the water alive. The alewife (Alosa pseudoharengus), which is now the basis of a growing trawl fishery in Lake Michigan, and lake herring (Leucichthys artedi) were not taken in significant amounts during the study. [11 figures, 5 tables, 4 references]

[8 figures, 1 reference] [Abstracter: L. Baldwin]

made in each geographical sector studied--the nature of the bottom.
ing operations--the principal species of fish caught--and of the observations
by Maurin in 1963). In this report, the author describes the results of the trawl-
Thalassa used a new type of trawl, the "Ville de Safi" or the "Lofoten" `described
the Cayar Trench (near Cape Verde) off Senegal. During the operations, the
extended the study, conducting 42 exploratory trawling operations as far south as
along the way. On a second mission, from March 29 through April 18, 1968, they
along the coasts of Rio de Oro and Mauritania, conducting 63 fishing operations
tute of Fisheries, aboard the research ship Thalassa, studied the ocean floor
From early November till the middle of December 1962, members of the Insti-

2.12 (Cross Reference: 1.0148)

LE CHALUTAGE AU LARGE DES COTES NORD-OUEST AFRICAINES
RESULTATS DES CAMPAGNES DE LA "THALASSA"
[TRAWLING ALONG THE NORTHWEST COAST OF AFRICA.
RESULTS OF VOYAGES OF THE "THALASSA"]

Maurin, Cl., M. Bonnet
Science et Peche, No. 177, 17 pp. (January 1969) (In French)

2.117

The Work of the Society of Naval Architects and Marine Engineers on Materials Research and Application, by S. T. Mathews, Marine Branch, National Research Council of Canada. 18+ pp., 3 tables, internal references.

Estimated Hull Work and Material Content for 100 Ft. Combination Fishing Vessel in Different Materials, by D. J. Fraser, Commercial Marine Services Limited, Montreal, Canada. 36 pp., 9 figures, 17 tables, 7 references.

Economic Criteria in Fish Boat Design, by Harry Benford, Department of Naval Architecture and Marine Engineering, The University of Michigan, Ann Arbor, Michigan. 37 pp., 2 figures, 6 tables, 18 references.

The Regulatory Aspects of Traditional and New Construction Materials, by Warren E. Bonn, Hulls & Equipment Division, Marine Regulations Branch, Department of Transport, Ottawa, Canada. 44 pp., 4 tables, 2 appendices.

Some Notes on Stress Analysis and Construction of Fishing Vessel Structures, by J. Saethre, Research Department, Det norske Veritas, Oslo, Norway. 23 pp., 8 figures, 2 references.

The Canadian Situation -- Trends in the Use of Traditional Construction Materials, by W. J. Milne, German and Milne, Naval Architects, Montreal, Canada. 24 pp., 2 figures, 3 tables, 3 appendices, internal references.

Construction Techniques of Fishing Trawlers, by Mike Waters, Marine Industries Ltd. Sorel, P.Q., Canada. 24 pp., 3 figures, 1 table, 14 photographs.

2.117

Cellular Plastics of Pure PVC as a Sandwich Core for Large FRP Boat Hulls, by Karl Brandl, Airex Ltd., Sins, Aargau, Switzerland. 57 pp., 56 figures, 7 tables, 27 references.

End Grain Balsa Cored Reinforced Plastic as a Fishing Vessel Construction Material, by Alex Lippay and Robert S. Levine, Balsa Ecuador Lumber Corporation, New York, N.Y. 33 pp., 11 figures, 4+ tables, 10 references.

Ferro-Cement as a Fishing Vessel Construction Material, by A. M. Kelly, and T. W. Mouat, British Columbia Research Council, Vancouver 8, B.C., Canada. 48 pp., 25 figures, 5 tables, 12 references, 1 appendix.

Ferro-Cement Boat Construction, by John Samson, Samson Marine Design Enterprises Ltd., Vancouver, Canada. 19 pp., 9 figures.

Ferrocement Boats, by T. M. Hagenbach, Seacrete Ltd., Wroxham, Norfolk, England. 23 pp., 3 photographs.

2.12 A PROGRESS REPORT ON THE DEVELOPMENT OF A SHRIMP TRAWL TO SEPARATE SHRIMP FROM FISH AND BOTTOM-DWELLING ANIMALS

High, William L., Ian E. Ellis, and Larry D. Lusz (Exploratory Fishing and Gear Research Base, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Seattle, Washington 98102)
Commercial Fisheries Review 31, No. 3, 20-33 (March 1969)

BCF [Bureau of Commercial Fisheries] has developed a trawl that separates, while fishing, shrimp from other marine animals. The design resulted from experiments aboard the 'John N. Cobb' and several cooperating Pacific Northwest commercial shrimp trawlers. Behavioral studies of the response of shrimp and associated marine animals to capturing gear contributed to the gear development.

The BCF shrimp-sorting trawl has long wings with double web panels. Shrimp pass through the large mesh inner panel and are retained by the small mesh outer panel, which leads to a cod end. Fish and other "trash" that cannot pass through the inner web lead aft, either passively or actively, to a trash chute that allows passage back to the sea bed. The shrimp-sorting trawl caught up to 2,000 pounds of shrimp per tow. This catch usually contained less than 1 percent trash, whereas conventional nets fished nearby had catches up to 80 percent trash.

(over)

 Author's abstract

2.3 THE EFFECT OF CLEANING PROCEDURES ON THE QUALITY ATTRIBUTES OF THE MARYLAND SOFT SHELL CLAM (MYA ARENARIA). I - EFFECT OF BLOWING ON SAND, SHELL, AND ABSORBED WATER

Ward, Janice W., Baruch Rosen, Mahlon C. Tatro (University of Maryland, Natural Resources Institute, Department of Seafood Processing, Crisfield 21817)
Chesapeake Science 10, No. 1, 48-52 (March 1969)

Water absorption of shucked soft shell clams increased in direct proportion to blowing (washing in water agitated with air) time. The sand and shell content of the shucked clams decreased as blowing progressed but at a decreasing rate. When the ratio of volume of clams to volume of water was reduced, the shucked clams absorbed more water, the percent of total solids decreased, and the amount of shell removed was greater. Should commercial standards for shucked soft shell clams be developed, the processor will find the data useful in optimizing the processing conditions. [7 figures, 1 table, 9 references]

II - Bacteriological studies.--Ibid. 53-58. Ward, Janice F., and Mahlon C. Tatro. Two methods of washing shucked clams are used commercially: blowing (washing in water agitated with air) and spraying. The purpose of this study was to examine the effectiveness of these two methods from the bacteriological standpoint.

(over)

 ABSTRACTER: F. T. Piskur

2.3 THE EFFECT OF CLEANING PROCEDURES ON THE QUALITY ATTRIBUTES OF THE MARYLAND SOFT SHELL CLAM (MYA ARENARIA). III - PILOT PLANT STUDIES

Ward, Janice F., and Mahlon C. Tatro (University of Maryland, Natural Resources Institute, Department of Seafood Processing, Crisfield 21817)
Chesapeake Science 10, No. 1, 59-63 (March 1969)

In an earlier study, the authors found high bacterial counts in shucked soft shell clams blown (washed in water agitated with air) under commercial conditions. The present study was carried out to determine the cause of the high bacterial counts. The shucked clams were blown in sterile water, in inoculated water, and in chlorinated water. In one test, the same water was used five times for blowing clams in order to determine the effect of repeated use of the washing water on the bacterial quality of the clams blown in the water.

When the shucked clams were blown in sterile water in equipment free of contamination, the bacterial quality of the resulting product was superior to that of the unblown clams. Bacterial counts of the blown clams were higher than those of the unblown clams when inoculated water was used in the blowing process.

Use of refrigerated water offered some advantage over nonrefrigerated water in decreasing the bacterial buildup when the same water was used repeatedly. Use of chlorinated water was also helpful in decreasing bacterial counts in blown

(over)

 ABSTRACTER: F. T. Piskur

3.231 FREON FREEZER TO COMPETE DIRECTLY WITH IQF [INDIVIDUALLY QUICK FROZEN] VEGETABLE, FRUIT SYSTEMS

Anonymous
Quick Frozen Foods 31, No. 8, 109-111, 153 (March 1969)

After 5 years of development, the Freon Freezer is being marketed commercially. In operation, the system works as follows: the material to be frozen is passed through water and then fed onto a shallow receiving tray containing liquid freon (dichlorodifluoromethane), which gives the material a frozen crust; it is then slid onto a continuously moving wire-mesh conveyor belt, which moves it beneath nozzles that spray it with -22° F. freon to complete the freezing process. Overhead condensers that maintain a temperature of -45° F. reconvert the freon to a liquid, which flows back into the system for reuse.

Freon, which has been approved by the Food and Drug Administration for use on food, is inert, odorless, and nontoxic; it costs about $0.30 a pound. The system uses about 1.5 lb. for every 100 lb. of food frozen. The preliminary wetting of the material with water leaves a thin coat of moisture that virtually obviates its absorption.

The system is claimed to have the following advantages: (1) Freezing costs are low, 1¢ a pound or less. (2) Not only can the freezant be reused, it can be used continuously for a variety of products. Because it is manufactured at three geographically strategic plants, supply is no problem. (3) The products being

(over)

 ABSTRACTER: L. Baldwin

2.3 (Cross Reference: 1.82)

Spray washing and blowing of shucked soft shell clams definitely decreased the total plate counts of the shucked clams; however, the processes were not effective in reducing the count of coliform and fecal coliform organisms. Spray washing was more effective in reducing total bacterial counts than was blowing. Blowing, on the other hand removed sand and shell more effectively than did spray washing. [2 figures, 4 tables, 4 references]

Tainted bivalves are suspended in salt water and treated with ultraviolet light.

2.12 (Cross Reference: 2.1121)

Shrimp catch rates have been less when using the shrimp-sorting trawl than for conventional trawls. This problem is being studied. Time-consuming sorting, however, is nearly eliminated, and shrimp quality improved. The sorting trawl permits fishing during late evening and morning hours of darkness, and on grounds not now fished because of high trash catches. Research is continuing to further improve catch rates and separation, and to modify the trawl for other shrimp fisheries. [11 figures, 2 references]

2.2 (Cross Reference: 1.8)

BIVALVE PROCESSING

U.S. Patent 3,418,138
Dennis, J. M., Rossman
Food Technology 23, No. 4, 148 (April 1969)

3.231 (Cross Reference: 3.2342)

frozen are not dehydrated by the freezing process--a drip loss of 3-5 percent is estimated; even bone darkening is assertedly eliminated. Thus quality is unimpaired and product yield is great. (4) Fragile foodstuffs of varying thicknesses--for example, strawberries or breaded seafoods--can be handled routinely, for the conveyor moves them smoothly and at the speed best suited to the material. The food emerges from the freezing unit at about 0° F., so no special handling or packaging is required. (5) The unit takes up less space than do freezing units of comparable volume. The smaller units, those with a freezing capacity of 3,000 lb. per hr., as required by seafood processors, are only 25 ft. long; this size unit will cost between $90,000 and $115,000. (6) The unit is completely enclosed, so the system creates no exterior sanitation problems. (7) Installation of the system requires no massive overhaul of existing equipment--a conventional refrigeration system that provides an evaporator temperature of from -40° to -45° F. will serve. (8) The system can be kept operating by one man working part time. Although the manufacturer provides technical assistance if needed, the plant's regular maintenance men can keep the system in repair. (9) The operational life of the Freon Freezer is expected to be equal that of other types of freezer. (10) The system is particularly adaptable to automation, thereby giving it a labor-saving advantage over the most economical systems currently in use.

No attempts have been made to freeze prepared foods, although work is underway on baked products and products in boilable bags. The hope is that the system will so improve the texture and overall quality of relatively fragile foods that their desirability--and sales--will be increased. [6 photographs]

2.3 (Cross Reference: 1.82)

shucked clams. The authors concluded that the bacterial quality of blown shucked soft shell clams will be much better than that of unwashed clams if sanitary techniques are used. [1 figure, 3 tables, 5 references]

A screw feed appareus discrete pieces of meat.

2.3 (Cross Reference: 1.85)

SHRIMP PROCESSING

U.S. Patent 3,414,934
Skrmetta, R. Q., and C. B. Skrmetta
Food Technology 23, No. 4, 148 (April 1969)

Apparatus removes vein from shrimp.

2.3 MEAT PACKING APPARATUS

U.S. Patent 3,414,936
Lugiewicz, R. C.
Cubb-Pac Corp.
Food Technology 23, No. 4, 148 (April 1969)

1.21 FIRST REPORT OF ANCHOVY TAGGING IN CALIFORNIA

Wood, Richard, and Robson A. Collins (Marine Resources Operations, California Department of Fish and Game)
California Fish and Game 55, No. 2, 141-148 (April 1969)

For fishermen and others concerned with the fish-reduction industry, the decline in the fishery for Pacific sardine (Sardinops caeruleus) may be offset by the reported increase in the population of northern anchovy (Engraulis mordax). To test this assumption, the authors tagged 100,114 anchovy and released them as far north as San Francisco Bay and as far south as Cape Colnett, in Baja California. The stainless-steel tags were recovered by magnets during the reduction process. Further refinements in the recovery procedure are expected to yield more precise data about the area of catch and the catching vessel. [6 figures, 1 table, 7 references] [Abstracter: L. Baldwin]

3.25 LIQUID NITROGEN FOR FOOD TRANSPORTATION

Harris, M. I. (Air Products, Ltd.)
Modern Refrigeration and Air Conditioning 72, No. 850, 60-62, 86 (January 1969)

Liquid-nitrogen-refrigerated vehicles for food transporation are being increasingly used in the United Kingdom. Such system are useful where accurate temperature control is desirable. The author describes a system that is capable of maintaining any preset temperature from ambient to -20° F. or lower. It is simple in design, operates automatically, and requires no auxiliary power. The temperature is maintained by injecting liquid nitrogen from an insulated container into the cargo space. The refrigeration process takes place in two stages: (1) The liquid nitrogen flashes to a gas and absorbs 86 B.t.u./lb. of latent heat. (2) The nitrogen gas, at about -320° F., passes down through the cargo and mixes with the warmer air. The air is displaced upward, and the turbulence that develops produces an even and rapid drop in temperature. As the gaseous nitrogen warms up from -320° to 0° F., it absorbs an additional 80 B.t.u./lb. giving a total heat extraction of 166 B.t.u./lb.

The liquid nitrogen system has two distinct advantages (1) rapid cooling of cargo space and (2) maintenance of even temperatures at the preset level. No data are given on the operating costs, but the major cost item is the refrigerant consumed. The author forecasts the following future developments:

(over)

 ABSTRACTER: F. T. Piskur

3.26 PRIVATE LABEL

Anonymous
Quick Frozen Foods 31, No. 8, 41-81, 150-153 (March 1969)

(continued)

Second, it introduces four articles discussing particular aspects of private label programs.

1. "Frozen Private Label Plays Big Role in Safeway, Second Largest Chain," by Alan W. Young, Division Manager (pp. 46 and 153). Safeway Stores, a retail food chain, started its private label program in 1950 with one item, peas. It now carries about 200 frozen foods bearing its private labels; about 60 of these are seafoods.

2. "Factors Evaluated by Shop-Rite in Buying Frozen Private Label," by Martin Kern, Director of the Frozen Food Division, The Wakefern Food Corporation, Elizabeth, N.J. (pp. 47-48 and 150). One of the most successful cooperatives in the country, Shop-Rite carries 131 different frozen food items bearing its private label. Although the private label items represent only 18.6 percent of the total frozen foods carried, they account for 32.5 percent of the total frozen foods sold.

3. "Frozen Institutional Private Label Spurred by Special Requirements," anonymous (pp. 49 and 151). Products bearing the private label ensure the steady supply and the consistent quality demanded by a specialized clientele.

4. "The Role of a Frozen Food Broker in Factoring Private Label," by Gordon D. Murphy, President of Crest Eastern Corp., Inc., Fort Lee, N.J. (p. 50). The

(over)

 ABSTRACTER: L. Baldwin

3.26 PRIVATE LABEL

Anonymous
Quick Frozen Foods 31, No. 8, 41-81, 150-153 (March 1969)

Because of the economic importance of products bearing a store's own label, Quick Frozen Foods surveyed the major merchandising outlets in the United States to determine their use of private labels on frozen food items. Almost two-thirds of all those responding to the survey used private labels.

From the responses, QFF compiled a "Directory of Frozen Food Private Label Buyers" (pp. 51-81). This directory lists the name and address of each outlet, the products it carries, the brand names under which the products are sold, and the name of the outlet's buyer. The outlets are grouped according to whether they are retail chains (retail food stores, usually of supermarket size, under the control and ownership of a single company), cooperatives (individually owned stores and small individually owned retail chains, each member of which is part owner of a buying and distributing organization operated solely for the benefit of the members), voluntaries (privately owned food-distribution or -wholesaling companies that sell to independents--either single stores or retail chains--on a very advantageous basis if minimum buying requirements are met), or distributors (independent wholesalers with warehousing and delivery systems and usually, as distinguished from voluntaries, quite small minimum-order requirements and a sales staff). Seven unclassified "other" outlets are grouped together at the end of the directory

(over)

 ABSTRACTER: L. Baldwin

3.337 USE OF COMPUTER-DERIVED TABLES TO CALCULATE STERILIZING PROCESSES FOR PACKAGED FOODS
2. APPLICATION TO BROKEN-LINE HEATING CURVES

Griffin, Roger C., Jr., and David H. Herndon (Packaging Research Division, Reynolds Metals Company, Richmond, Virginia 23219); and C. Olin Ball (P.O. Box 802, New Brunswick, New Jersey 08903)
Food Technology 23, No. 4, 121-124, 126 (April 1969)

In Part 1, on the application to straight-line heating curves, Herndon et al. (1968) showed that data obtained from one retort at one set of process conditions could be used to calculate a process run under a different set of conditions in a different retort. Such calculations cannot be made with "broken-line" heating curves because of lack of information on those factors that determine the location of the point where the two lines intersect. Some of the factors that may influence the location of the intersection point are: processing temperature, container size, food size or orientation, food temperature, differential between processing temperature and food temperature, time, and heat input. In most cases there is an interaction of several or all of the factors, with differing proportionate influence for different foods. It is imperative, then, that the heat penetration rates for foods that exhibit "broken-line" heating curves be determined under conditions as nearly identical as possible to those that will be used in commercial operation. The method of calculation is explained, and sample problems and calculations are given for two-, three-, and four-segment broken-line heating curves. [1 figure, 1 reference]

 ABSTRACTER: F. T. Piskur

3.26

"The Importance of PRIVATE LABEL in Today's FF Business" (pp. 41-45, 152-153) serves two purposes. First, it is a product-by-product breakdown of the data contained in the directory. The section on seafoods is as follows.

Frozen seafood product bearing private label	Outlets that carry each product				Those responding to the QFF survey who carry the item
	Retail chains	Cooperatives	Voluntaries	Distributors	
	%	%	%	%	%
Shrimp - headless	13.3	9.4	11.9	12.5	11.3
- peeled, deveined	26.7	15.6	21.4	20.0	22.1
- breaded	24.4	12.5	28.6	25.5	23.8
Fish - fillets	31.1	9.4	35.7	34.6	27.7
- steaks	20.0	6.3	26.2	30.9	22.1
- sticks	40.0	18.8	42.9	40.0	34.1
- portions	17.8	3.2	21.4	30.9	19.5
- crisps	2.2	--	--	--	0.5
Scallops	4.4	--	2.4	3.6	2.6
Lobster tails	--	--	--	1.8	0.5
Oysters	--	--	--	1.8	0.5

According to the survey, 82.1 percent of the cooperatives use the private label, 80.0 percent of the voluntaries, 70.3 percent of the retail chains, and 60.4 percent of the distributors. Yet, as can be seen from the table above, a lower percentage of every seafood item bears the cooperatives' private label than any other outlet's.

3.231 (Cross Reference: 0.8)

AN ENGINEER'S GUIDE TO COLD STORE PRACTICE
14--HEATING MATS AND PIPE TRACING (1) DESIGN

Herbert, R. H.
Modern Refrigeration and Air Conditioning 72, No. 850, 74-76, 80, 84 (January 1969)

The article deals with some practical considerations in the design of:

1. Heating mats.--To prevent the formation of ice on the threshold of an opening into a refrigerated space.

2. Door-heating installations.--To prevent the formation of ice between the matting surfaces.

3. Pipe-heating installations.--To heat up the contents of the pipe or to avoid an undesirable loss of heat from the liquid in the pipe (also to prevent freezing of the liquid in the pipe). [Abstracter: F. T. Piskur]

3.2342 IMMERSION FREEZING EQUIPMENT

U.S. Patent 3,415,075
Pelmulder, J. P., and E. Thuse
FMC Corp.
Food Technology 23, No. 4, 189 (April 1969)

Freezing unit contains a turntable with baskets and is designed for use with a gaseous refrigerant.

3.25

1. Development of a partitioned insulated transport body with one basic liquid-nitrogen system providing different temperature controls for each compartment.

2. Development of a modified liquid-nitrogen system capable of controlling both the temperature and the oxygen content in the cargo space of a partitioned transport body.

3. Establishment of a motor transport network throughout Europe utilizing the liquid-nitrogen refrigeration system and served by motorway service stations located at strategic points.

3.27 (Cross Reference: 7.89)

FREEZE THAW INDICATOR

U.S. Patent 3,414,415
Broad, R. L., Jr.
Food Technology 23, No. 4, 189 (April 1969)

The freeze thaw indicator is a capillary so adapted as to indicate the length of time that a frozen product has remained above a predetermined temperature.

3.26

broker's value in the specialized field of private label products lies in his ability to furnish services the firms he sells to may not be able to provide for themselves. For example, he must know, and be able to advise about, legal regulations and product gradings and specifications; he must be able to do market research and update warehousing and distribution methods; his capabilities must range from art layout and design to computer operations.

Private label items may be packed in the retailer's own plant or they may be purchased under contract from outside suppliers. If the retailer purchases them outside, he gives detailed specifications to ensure a quality product. And he inspects the supplier's facilities frequently to ensure compliance--the production line, the warehouses, and the transportation equipment. Even after a product is delivered, it may be inspected in the retailer's test kitchen or by one of his taste panels.

The benefits of a private label program are manifest. To the consumer, it means a lower price, since the costs of distribution are lower; better quality, since, the authors claim, the quality of most private label products exceeds USDA standards; and a wider choice, since retail outlets stock equivalent lines of private and brand label products. To the retailer, it means both a better profit margin and a complete control of the merchandising, promoting, and pricing of his products in a way best suited to his particular market.

The disadvantages, however, can prove ruinous. For example, if one batch of a single product bearing the private label is poor, it could damage the entire private label line. Sometimes the owner of a private label has to assume the total costs of promoting a product. And sometimes the ownership of a private label leads to what one author calls "private label vanity." The result is a blindness to the economic practicalities of a product's value.

4.11 THE ANALYSIS OF OILS AND FATS BY GAS CHROMATOGRAPHY. VI - CALCULATION OF EQUIVALENT CHAIN LENGTH AND MODIFIED EQUIVALENT CHAIN LENGTH VALUES

Jamieson, G. R., and E. H. Reid (Chemistry Department, The Paisley College of Technology, Paisley, Scotland)
Journal of Chromatography 39, No. 1, 71-74 (January 14, 1969)

Separation factors have been used to tentatively identify methylene-interrupted olefinic esters. Haken (1966; 1967) applied the idea to the correlation of gas-liquid chromatography (GLC) retention data and structural parameters using an equation of the following type:

$$V_{R(x+2,y+1)} = V_{R(x,y)} \cdot V_{R(x+2,y)} \cdot V_{R(x,y+1)}$$

x = total carbon chain length
y = number of methylene-interrupted double bonds
$V_{R(x+2,y)}$ = ethylene-unit separation factor
$V_{R(x,y+1)}$ = Type I separation factor

The logarithmic form is:

$$ECL_{(x+2,y+1)} = ECL_{(x,y)} + 2 + k_I$$

(over)

 ABSTRACTER: F. T. Piskur

4.91 ESSENTIAL FATTY ACIDS AND IONIC PERMEABILITY OF LECITHIN MEMBRANES

Moore, J. L., T. Richardson, and H. F. Deluca (Department of Food Science and Industries, and Department of Biochemistry, University of Wisconsin, Madison)
Chemistry and Physics of Lipids 3, No. 1, 39-58 (January 1969)

The purpose of the study was to determine the possible relation between essential fatty acids (EFA) and membrane permeability by using a model system that exhibits a number of phenomena characteristic of biological membranes. The "membranes" used in this study were given a fixed negative charge by incorporation of dicetylphosphate and a varied lecithin fatty acid composition by use of lecithins from various sources.

Lecithins were isolated from egg yolk and from the internal organs of fish, EFA-deficient rats, and control rats. Lecithin-dicetyl phosphate liquid-crystal vesicular particles were formed from each in 145 mM NaCl. The extraparticulate Na^+ was removed by dialysis, and the subsequent rate of Na^+ efflux from within the particles was determined at various temperatures.

"Membranes" of lecithin from EFA-deficient rats permitted a faster rate of Na^+ efflux at 25° C. and a slower rate at 50° C. than "membranes" of lecithin from egg, fish, or control rats. At 37° C., the rate of Na^+ efflux from within "membranes" of lecithin from EFA-deficient rats was greater than that for the

(over)

 ABSTRACTER: F. T. Piskur

6.195 RELATION BETWEEN THE AVAILABLE ESSENTIAL AMINO ACID PATTERNS IN FOUR FISH MEALS AND THEIR VALUES IN CERTAIN BROILER RATIONS

Anderson, J. O., K. Wisutharom, and R. E. Warnick (Animal Science Department, Utah State University, Logan 84321)
Poultry Science 47, No. 6, 1787-1796 (November 1968)

The paper reports on experiments to determine by a chick test the most limiting amino acids in commercial fish meals prepared from four different species of fish. The meals were prepared from: (1) herring, (2) anchovy, (3) hake, and (4) tuna. Samples from two lots of meal from herring, anchovy, and hake and from one lot of tuna meals were studied. All fish meals were fairly well balanced, but the pattern of the essential amino acids was different for each of the four meals tested. Where two lots of meal were studied from one species, the essential amino-acid patterns for the two lots within each species appeared to be somewhat similar, but the overall level of available essential amino acids differed. When each of the meals was used to provide 3.6 percent protein in a 21.8-percent-protein ration based on corn and cottonseed meal, the fish meals showed large differences in performance in the chick feeding tests. The levels of lysine and methionine in the two fish meals that showed the greatest difference in value in these experiments appeared to be the most important factors involved. When each sample lot of fish meal was used to provide 5 percent protein in a 24-percent-protein ration based on corn, cottonseed meal, and soybean meal, differences in

(over)

 ABSTRACTER: F. T. Piskur

6.195 AVAILABLE AMINO ACIDS IN POULTRY FEEDSTUFFS

Anderson, J. O., and R. E. Warnick (Animal Science Department, Utah State University, Logan)
Feedstuffs 41, No. 13, 32-34, 36-37 (March 29, 1969)

Although microbiological and chemical procedures are used in determining the amino-acid levels in feeds, they cannot be used alone when poultry rations are being formulated. One reason is the divergent values yielded by the procedures. The differences can be caused by variations in the samples tested or by variations in the results obtained when the protein is hydrolyzed before analysis--sometimes hydrolysis is incomplete, and sometimes certain of the amino acids are partially or completely destroyed. Since it is difficult to determine how much destruction has taken place, it is difficult to determine how much protein a given hydrolyzate represents and how much of each amino acid remains in the protein.

Even if the exact amount of each amino acid in a chick feed could be determined, the effectiveness of the protein could not necessarily be specified, for the chick must be able to absorb the amino acids to use them. And all the bound amino acids in a feed do not have the same absorbability--that is, the same availability to the chick. The experiments summarized here were conducted to show how much of each essential amino acid is supplied by feeds made from several grains and seed meals, autoclaved alfalfa, poultry-byproduct meals, and four fish meals (herring, hake, tuna, and Peruvian fish meals).

A basic ration containing 14 percent protein from the feed and 4 percent protein from a mixture supplying all the essential amino acids was prepared for each of the 19 protein-containing feeds. (In the barley rations, 6.4 and 7.5 percent

(over)

 ABSTRACTER: L. Baldwin

4.91 (Cross Reference: 0.7)

"membranes" of control rats. Activation energy values for Na^+ efflux, as calculated from Arrhenius Plots, were 15, 11.5, 9.5, and 4.5 kcal./mole Na^+ for "membranes" of lecithin from control rat, fish, egg, and EFA-deficient rat, respectively.

The content of linoleic ($\omega 6$) and linolenic ($\omega 3$) fatty acid families in the different lecithins was, respectively: control rat, 43.6 and 2.3 percent; fish, 15.5 and 39.1 percent; egg, 30.2 and 0.6 percent; and EFA-deficient rat, 4.5 and 1.0 percent. The differences in levels of $\omega 6$ and $\omega 3$ fatty acids appeared to be more closely related to differences in activation energies than did the differences in individual fatty acid levels.

The author concludes that the results obtained from this simple model system cannot be directly extrapolated to "prove" that EFA influence the permeability of biological membranes. However, the results are in agreement with previous findings that have suggested that dietarily induced or species variation in fatty acid composition of membrane phospholipids might influence the permeability characteristics of biological membranes. [6 figures, 2 tables, 68 references]

4.11

where ECL = equivalent chain length
k_I = difference in ECL values of pairs of esters used to calculate Type I separation factors.

The ethylene-unit separation factor in the ECL system should be 2; however, for many liquid phases the semilog plot of saturated methyl esters is not parallel to those of unsaturated esters and the difference in ECL values of adjacent members of homologous series of unsaturated esters is less than 2. When modified chain length (MECL) values are used, the ethylene-unit separation factors are much closer to the expected value of 2. The equation used in the form $MECL_{(x+2,y+1)} = MECL_{(x,y)} + 2 + k_I$ gives better agreement between calculated and determined MECL values than between the corresponding ECL values.
[3 tables, 9 references]

5.2 (Cross Reference: 1.12)

ANTITHIAMINE FACTOR(S) IN TISSUE OF TUNA AND COATFISH

Hilker, D. M., and O. Peter (Univ. of Hawaii, Honolulu)
Chemical Abstracts 70, No. 3, 9588a (January 20, 1969)

6.133 SOLVENT EXTRACTION OF FATTY ACIDS

British Patent 1,129,165
Lloyd, Anthony M.
Rose, Downs and Thompson Ltd.
Chemical Abstracts 70, No. 2, 5346x (January 13, 1969)

6.135 FAT DEODORIZATION

German Patent 1,282,822
Battistamartinenghi, G.
Food Technology 23, No. 4, 184 (April 1969)

Water vapor passed through heated oil or fat held at reduced pressure removes acid and volatiles.

6.137 (Cross Reference: 1.953)

REFINING HEAD OILS OF WHALES

British Patent 1,125,648
Nitto Hogei K. K.
Chemical Abstracts 70, No. 2, 5347y (January 13, 1969)

6.195

of the protein were supplied by the amino-acid mixtures because of the low level of protein in barley.) Each basic ration was modified by removal of one of the essential amino acids from the amino-acid mixture; thus the feed alone was the source of that particular amino acid. Then each basic ration or one of its 9 or 10 modifications was fed to groups of broilers for 12 days. The gain and the gain-to-feed ratio of each group fed the modified rations were expressed as a percentage of the gain or the gain-to-feed ratio of chicks fed the basic ration.

Although all the fish meals had more of the sulfur amino acids than most of the plant proteins had, the plant proteins had more phenylalanine, tyrosine, and tryptophan. Some of the findings about the fish meals are tabulated below.

Fish meal	Level of available amino acid									Percent protein in feed	Gain-to-feed ratio	Kcal. metabolizable energy/kg. ration
	Methionine & cystine	Threonine	Valine	Isoleucine	Leucine	Arginine	Tryptophan	Phenylalanine & tyrosine	Histidine			
Herring	3.5	4.1	5.5	4.1	7.0	6.9	1.05	7.3	1.95	71.9 73.7	0.65	3,065
Peruvian	3.7	3.8	5.3	4.7	---	5.85	1.2	7.8	2.35	70.8	0.57	3,130
Hake	3.4	3.8	4.85	3.9	6.7	5.85	0.85	6.4	1.85	72.0	0.62	3,130
Tuna	3.1	4.1	5.3	4.35	---	5.9	1.1	7.2	2.4	53.1	0.53	3,100

Results of the chick tests were correlated with published results obtained by microbiological and chemical methods. [7 tables, 5 rererences]

6.195

performance in the chick tests were smaller and statistically insignificant.
[7 tables, 4 references] [Abstracter: F. T. Piskur]

6.54 TOTAL PROTEIN VALUE OF PROTEIN- AND AMINO ACID-SUPPLEMENTED BREAD

Jansen, G. R.
American Journal of Clinical Nutrition 22, No. 1, 38-43 (January 1969)

The paper reports on the evaluation of the quality and quantity of the protein of a series of supplemented breads. Standard white bread was supplemented with nonfat dry milk, soy flour, or fish flour [fish protein concentrate], with and without the addition of L-lysine monohydrochloride. The net protein value was obtained by multiplying the measure of quality by the measure of quantity.

White bread containing added L-lysine monohydrochloride had a net protein value approximately the same as that of breads supplemented with 3 percent fish flour or 10 percent nonfat dry milk. The net protein values of white breads supplemented with 3 percent fish flour, 6 percent fish flour, and 10 percent promine R (isolated soy protein) were 9.7, 11.8, and 13.0 percent, respectively. Addition of L-lysine monohydrochloride along with these supplements raised the net protein values to 12.9, 14.4, and 16.7 percent, respectively. The combination of proteins and amino acids apparently raises the protein level and supplies enough of the second limiting amino acid to give a better response to lysine. At the same time, addition of lysine monohydrochloride enables use of lower [and more organoleptically acceptable] levels of the protein supplement.

(over)

 ABSTRACTER: F. T. Piskur

7.599 RAPID AUTOMATIC ANALYSIS OF SUGAR COMPONENTS IN GLYCOPROTEINS. 1. HEXOSAMINES

Lee, Y. C., Jane R. Scocca, and L. Muir (Department of Biology and McCollum-Pratt Institute, The Johns Hopkins University, Baltimore, Maryland 21218)
Analytical Biochemistry 27, No. 3, 559-566 (March 1969)

Most of the colorimetric methods for the analysis of amino sugars require separation of the sugar components from the other compounds that interfere with the colorimetric measurement. Colorimetric methods in combination with a chromatographic system have been used; however, the time required for each analysis precludes their use for routine analysis. The present paper describes a rapid method for the automatic determination of hexosamines in glycoproteins. The hexosamines are separated by cation-exchange chromatography and automatically determined by a neocuprione reducing sugar method. The results are highly reproducible, and as little as 1 μg. of glucosamine can be measured accurately. [4 figures, 2 tables, 13 references]

 ABSTRACTER: F. T. Piskur

7.51 ENZYMIC METHOD FOR QUANTITATIVE DETERMINATION OF NANOGRAM AMOUNTS OF TOTAL AND OXIDIZED GLUTATHIONE: APPLICATIONS TO MAMMALIAN BLOOD AND OTHER TISSUES

Tietze, Frank (National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Public Health Service, U.S. Department of Health, Education, and Welfare, Bethesda, Maryland 20014)
Analytical Biochemistry 27, No. 3, 502-522 (March 1969)

Because of the widespread distribution of glutathione and its apparent involvement in many biological functions, there is a continual interest in methods of analysis of this cellular component. The method described in this paper grew out of a need for a procedure for oxidized glutathione (GSSG) that was more sensitive than previously available methods.

A method for the analysis of nanogram quantities of glutathione (GSH) was developed that is based on the catalytic action of GSH or GSSG in the reduction of 5,5'-dithiobis-(2-nitrobenzoic acid) (Ellman reagent) by a mixture of triphosphopyridine nucleotide (TPNH) and yeast glutathione reductase. The procedure effectively measures the total glutathione (GSH + GSSG) content of unknown mixtures and is not subject to appreciable interference by other thiol compounds. The author suggests that the catalytic action of glutathione in the system resides in the continued enzymic regeneration of GSH, present initially or formed enzymically from GSSH, following its interaction with the sulfhydryl reagent.

(over)

 ABSTRACTER: F. T. Piskur

9.11 HYDROLOGICAL CONDITIONS IN CLEAR LAKE, TEXAS, 1958-66

Pullen, Edward J. (Bureau of Commercial Fisheries Biological Laboratory, U.S. Fish and Wildlife Service, Galveston, Texas 77550)
U.S. Fish and Wildlife Service, Special Scientific Report-Fisheries No. 578, 8 pp. (January 1969)

Temperature and salinity data were collected in 1958-66, and dissolved oxygen, dissolved organic nitrogen, and total phosphorus analyses were made on samples collected in 1964-66 in Clear Lake, a small estuary that flows into upper Galveston Bay.

Seasonal trends in bottom water temperature were similar in the different years and were related closely to trends in air temperature. Average water temperatures were lowest (about 13° C.) in January and February and highest (about 31° C.) in July. The rate of warming and cooling was directly related to the magnitude of the annual temperature difference between the warm and cool months.

Salinity ranged from 0.1 to 23.7 p.p.t. (parts per thousand) and was related inversely to stream flow and precipitation. Variations in rainfall resulted in fluctuations in stream flow and these, in turn, were reflected by variations in salinity.

(over)

 Author's abstract

7.51

The method was sensitive enough for the determination of glutathione in extracellular fluids such as plasma and saliva without pretreatment of the sample. The pretreatment of tissue extracts with N-ethylmaleimide to form an enzymically inactive complex with free GSH allowed the determination of oxidized glutathione in these tissues. [4 figures, 10 tables, 43 references]

9.1 ROBUSTNESS OF THE DELURY POPULATION ESTIMATOR

Braaten, Duane O. (Biomathematics Group, University of Washington, Seattle)
Journal of the Fisheries Research Board of Canada 26, No. 2, 339-353 (February 1969)

This is a report of the suitability of estimating population size by the usual DeLury Estimator and three modifications of it derived from the generalized exact deterministic catch equation of Beverton and Holt. The results indicated that the Generalized Estimator is overall the best: the Effort-corrected Estimator is just as effective but requires effort correction. The usual DeLury Estimator is unacceptable on the average; the Weighted Estimator has high variance. [6 tables, 15 references] [Abstracter: F. T. Fiskur]

6.54

Bread supplemented with high levels of fish flour or soy flour in combination with lysine monohydrochloride would furnish enough dietary protein of sufficient biological value to require 40 to 50 percent of the daily calories be supplied by the bread. The remainder could be supplied by cassava. The author suggests that the greatest potential of fish flour or soy supplements in regions where cereals are the staple foods is in the use of the supplements in combination with lysine monohydrochloride. [1 figure, 1 table, 16 references]

7.53 FAT MEASUREMENT

U.S. Patent 3,417,625
Whitehead, R. C., Jr.
Honeywell Inc.
Food Technology 23, No. 4, 148 (April 1969)

Semiautomatic apparatus measures the amount (in percent) of fat in tissue. The technique is based on the changes in volume and temperature that take place in tissue samples subjected to compression.

9.11 (Cross Reference: 9.17)

Dissolved organic nitrogen ranged from 23.5 to 171.5 µg. at./l. (microgram atoms per liter) and averaged 66.4 µg. at./l. Total phosphorus ranged from 1.7 to 26.3 µg. at./l. and averaged 8.2 µg. at./l. Phosphorus values increased markedly in July 1966. No correlation existed between nitrogen or phosphorus and stream flow or rainfall.

Dissolved oxygen ranged from 3.8 to 19.3 p.p.m. (parts per million). [7 figures, 6 tables, 3 references]

6.34 (Cross Reference: 6.54)

POTATO CHIP PRODUCT

German Patent 1,280,646
Stewart and Arnold Ltd.
Food Technology 23, No. 4, 185 (April 1969)

Pastes containing potato powder and starch are extruded into a bath of aqueous solutions of sodium chloride and sodium phosphate. The extrusions are boiled in water containing calcium chloride (to gelatinize the starch) then dried to a rubbery consistency. The "cooked" and partially dried product is sliced thin and dried further.

7.51 (Cross References: 1.82, 1.84)

PARAMYOSIN: MOLECULAR LENGTH AND ASSEMBLY

Kendrick-Jones, John (Department of Biology, Brandeis University, Waltham, Massachusetts 02154), Carolyn Cohen (Laboratory of Structural Molecular Biology, Children's Cancer Research Foundation, Boston, Massachusetts), Andrew G. Szent-Györgyi (Department of Biology, Brandeis University), and William Longley (Department of Anatomy, Duke University, Durham, North Carolina 27706)
Science 163, No. 3872, 1196-1198 (March 14, 1969)

Paramyosin prepared from the muscles of Pecten irradians and Mercenaria mercenaria was used to produce periodic aggregates by divalent cations. The paracrystals thus formed had a 725 Å axial period; electron micrographs revealed simple negative staining patterns. An interpretation of the negative staining permitted the authors to deduce that the smallest length of the molecule for paramyosins from P. irradians was 1,275 Å; for paramyosins from M. mercenaria, about 1,245 Å If a two-chain α-helical model were assumed, the molecular weight of paramyosin then was 200,000 daltons.

The authors also interpreted the negative staining patterns in terms of overlaps (where the stain is largely excluded) and gaps (where the stain is bound) in the molecular assembly. Antiparallel relations between molecules led to the assembly in vitro of filaments with opposite polarity at either end. The biologically significant implications of the assembly are described.
[2 figures, 19 references] [Abstracter: L. Baldwin]

9.125 A COMPARISON OF SOME BLOOD PROPERTIES BETWEEN THE TWO GROUPS OF CHUM SALMON, ONCORHYNCHUS KETA (WALBAUM), REARED IN A SALT WATER POND AND IN A FRESH WATER POND

Kashiwagi, Masaaki, and Ryuhei Sato (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 19, No. 1, 56-61 (June 1968)

The physiological characteristics of chum salmon raised in salt water for 18 and 25 months and in fresh water for 18 and 21 months were compared. The findings are tabulated on back of card. (All figures represent average values derived for 11-15 fish.)

(over)

 ABSTRACTER: L. Baldwin

9.16 FLORIDA SHRIMP FARM NEAR COMMERCIAL STAGE

Robinson, Peg, and Hal Borden
National Fisherman 49, No. 12, 6C (March 1969)

Lease for Large Bay Area Seen as Last Major Hurdle, by Peg Robinson. Chosen from numerous potential sites ranging from Texas to the Carolinas, a 5-acre site in one of the bayous of St. Andrew Bay is being used to breed, hatch, and grow the first shrimp to be raised commercially anywhere outside of Japan. Starting in 1968 with 500 shrimp from the Gulf of Mexico--200 of these were gravid females--the eight-pond farm has already donated 2,000,000 young shrimp to the Florida Board of Conservation for release into West Bay, an arm of St. Andrew. The Board expects to prove that shrimp can be bred in Florida even more practically than they can in Japan, for natural conditions are superior in Florida. Objectives include replenishing the natural shrimp supply, which measure will improve both commercial and sport fishing, since shrimp-loving fish will be attracted by the more abundant food; generation of new service industries in the Panama City (Florida) area; stabilization of the domestic shrimp market; creation of an export economy in the shrimp market rather than the present import economy; and, of course, operation of a sound, profitable farming enterprise.

Marine Experts Endorse Akima Farming Project, by Hal Borden. Akima International, which holds the American rights to the shrimp-farming patents of two

(over)

 ABSTRACTER: L. Baldwin

9.17 EFFECT OF WOODLAND CLEARANCE ON STREAM TEMPERATURE

Gray, J. R. A. (Department of Zoology, University of Newcastle, Newcastle-upon-Tyne, England), and J. M. Edington (Department of Zoology, University College, Cardiff, Wales)
Journal of the Fisheries Research Board of Canada 26, No. 2, 399-403 (February 1969)

Evidence seems to indicate that streams flowing through woodland tend to be cooler in summer than streams flowing through fields. Greene (1950) and Larkin et al. (1959) suggested that felling of woods can increase the summer temperature of a stream to a level that is unsuitable for trout. The present study compared the summer temperature of the same stream before and after felling of the trees.

The stream studied was a small tributary in the River Coquet system at Rothbury in northern England. It flowed through open fields then through woodland. When the woods were felled, the section of the stream that had flowed through the woodland showed a marked rise in temperature during the summer. It is apparent that the amount of shading by trees is an important factor in determining the temperature of small streams.
[3 figures, 7 references]

 ABSTRACTER: F. T. Piskur

9.19 NATURAL AND ARTIFICIAL RADIONUCLIDES IN SEAFOODS AND MARINE PROTEIN CONCENTRATES

Beasley, Thomas M., and Charles L. Osterberg (Department of Oceanography, Oregon State University, Corvallis) and Yvonne M. Jones (Battelle Northwest Laboratory, Richland, Washington)
Nature 221, No. 5187, 1207-1209 (March 29, 1969)

The emphasis that is being placed on the oceans as a source of food prompted the authors to analyze 14 commercially packed seafoods and 11 types of fish protein concentrate (FPC) for radionuclide concentration. Since lead-210 and polonium-210 have been shown (Beasley, 1968) to concentrate in the bones and internal organs of marine fish, and since FPC is made from the whole fish, these isotopes might be present in FPC at elevated levels. Because of the projected use of FPC as a protein supplement in the diet of large segments of the world's population, the presence of radionuclides in marine organisms that serve as food for humans is of concern to the health physicist.

The concentrations (disintegrations per minute per gram wet weight) of lead-210 and polonium-210 were measured in reasonably fresh samples of cocktail shrimp, oysters, bay clams, rex sole, rockfish, and hake; and in either frozen or canned lobster tail, pink salmon, tuna fish, dungeness crab, sardines, kippered snacks, minced clams, and codfish. The preferential uptake of polonium-210 was pronounced in the fresh samples. If a decay time of 1-2 years between processing

(over)

 ABSTRACTER: L. Baldwin

9.16 (Cross Reference: 1.85)

of Japan's leading shrimp culturists, has requested permission to lease 5,000 acres in St. Andrew Sound, thereby expanding the original 5-acre experimental farm in Little Goose Bayou. Because chemicals will be used to clear the area of predators and because the farm will be fenced in, public doubts about long-range effects on the surrounding farms and about the public's right of access have arisen.

To dispel these doubts, a panel of experts from the Florida Development Commission, Florida State University, Akima International, the Florida Board of Conservation, and the U.S. Bureau of Commercial Fisheries was convened. The panel established that rotenone, the chemical to be used in clearing the Sound of predators, is easily controlled and quickly dissipated. Public use of the Sound will not be restricted, and the Sound itself will remain relatively unchanged. Among the suggestions was that all firms proposing to engage in mariculture should be judged on the individual merits of their sea-farm projects, a capability that scientists now have, and that the bays and estuaries to be used should be zoned to eliminate many of the problems that have arisen. The 16 firms that are interested in going into mariculture in Florida will invest about $100,000,000 all told if the Akima expansion plans receive State and local approval.

9.19 (Cross References: 2.9, 6.54)

and analysis be assumed, the measured values for lead-210 (which ranged from 0.047±0.003 d.p.m./g. in the minced clams to 0.005±0.003 d.p.m./g. in the salmon) can be assumed to correspond to the values at the time of catch to within 3-7 percent. The values for both isotopes were significantly higher than those reported for beef muscle or vegetable products.

The concentrations (d.p.m./g. dry weight) of polonium-210, lead-210, zinc-65, and potassium-40 were measured for FPC processed on the west coast of the United States, as were those of lead-210, radium-226, thorium-228, manganese-54, cesium-137, iron-55, and cobalt-60 for FPC processed on the east coast. The concentration of polonium-210 was markedly higher in the FPC made by the hydrolytic process; it decreased when the bone was removed. The decrease in the concentration of lead-210 when bones were removed was even more pronounced. Even with corrections for the differences between wet and dry weights, the polonium-210 concentrations in the hydrolyzed FPC from the west coast were about an order of magnitude higher than those in all the seafoods except oysters and bay clams.

In 1963, Holtzman estimated the human daily intake of lead-210 to be about 4 pico curies (pCi), 2 pCi from inhalation and 2 from ingestion. This intake would account for about 50 percent of the skeletal radiation derived from internally deposited radionuclides. If a person consumed about 30 g. of FPC a day, his daily intake of lead-210 would be 6 pCi from FPC alone. Adding another 4 pCi per day from other dietary sources and inhalation would make the total lead-210 intake 2.5 times as much as Holtzman estimated. Thus the use of FPC over a lifetime would make lead-210 and its daughters the principal contributor to the skeletal radiation dose accumulated by humans from internally deposited radionuclides. [3 tables, 19 references]

9.125 (Cross References: 1.35, 9.13)

Test fish	Age	Body characteristics		
		Length	Weight	Ratio of kidney weight to body weight
	Months	cm.	g.	Percent
Chum salmon reared in freshwater pond	18	21.5	158	0.87
	25	24.9	243	
Chum salmon reared in saltwater pond	18	28.4	290	0.49
	25	30.4	380	

Test fish	Water content	Blood characteristics			
		Freezing point depression of plasma	Erythrocyte count	Hematocrits	Mean corpuscular volume
	Percent	Δ (-°C.)	$\times 10^4/mm.^3$	Percent	μ^3
Chum salmon reared in freshwater pond	86.9	0.71	87.5	36.7	417.0
	83.3	0.47	121.5	46.8	383.6
Chum salmon reared in salt water pond	77.8	0.68	133.0	47.1	354.1
	76.5	0.58	137.9	47.1	341.3

9.16 (Cross Reference: 3.333)

INDIRECT PIGMENTATION OF SALMON AND TROUT FLESH WITH CANTHAXANTHIN

Schmidt, P. J., and E. G. Baker (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 26, No. 2, 357-360 (February 1969)

Color is an important quality factor of salmon flesh. Addition of pigments to fish reared in farm ponds could result in more attractively colored fish products. In this study, indirect pigmentation of the flesh of juvenile pink salmon, cutthroat trout, and rainbow trout was achieved by incorporating the carotenoid pigment canthaxanthin into the wet food. The fish were fed diets containing 190 and 450 mg. of canthaxanthin per kilogram of food for periods of from 7 to 31 weeks. The canned product prepared from the pigmented flesh of the rainbow trout had the appearance of canned coho salmon. The induced pigmentation seems to be more stable to heat processing than does the natural pigment of coho salmon. [1 figure, 1 table, 10 references] [Abstracter: F. T. Piskur]

9.19 CHLORINATED BIPHENYLS IN FISH, MUSSELS AND BIRDS FROM THE RIVER RHINE AND THE NETHERLANDS COASTAL AREA

Koeman, J. H. (Institute of Veterinary Pharmacology and Toxicology, Utrecht, The Netherlands), and M. C. ten Noever de Brauw, and R. H. de Vos (Central Institute for Nutrition and Food Research, Zeist, The Netherlands)
Nature 221, No. 5186, 1126-1128 (March 22, 1969)

Polychlorinated biphenyls (PCBs) are used in industry as lubricants, heat-transfer agents, and insulators; they are also used to increase the chemical and water resistance, the adhesiveness, and the flexibility of paints, synthetic resins, varnishes, and waxes. Because of their peculiar physical properties and their chemical stability, uses for PCBs will probably increase. The hazards they represent upon being released into the environment, then, are of vital concern to the fisheries.

In 1967, several British and Dutch authors reported finding PCBs in the tissues of fish and other wildlife. Their identification was based primarily on comparisons of the gas-liquid chromatographic retention times in sample extracts with those in solutions of industry-supplied PCB mixtures. Information about the identity of the individual peaks was not given. In the present report, the authors describe the occurrence and distribution in fish and sea-bird samples of PCBs identified by gas chromatography and mass spectrometry.

The tissues of roach (Leuciscus rutilus) and groundling (Gobio gobio) caught in the Rhine upstream from the estuary; mussel (Mytilus edulis) caught along the

(over)

 ABSTRACTER: L. Baldwin

9.6 BOTULISM
(Cross Ref.: 2.05)

Ingram, M., and T. A. Roberts (eds.)
Botulism, 531 pp. (1967) (Chapman and Hall Ltd., U.S.A. distribution, Barnes & Noble, 105 Fifth Avenue, New York, N.Y. 10003) ($22.50)
Reviewed by Karl O. Herz
Food Technology 23, No. 4, 140 (April 1969)

This book contains 50 or more articles and research reports on botulism presented at the 5th International Symposium on Food Microbiology held in Moscow, U.S.S.R., in July 1966. The reports deal with distribution of Clostridium botulinum; the factors affecting thermal, radiation, and chlorine resistance of the spores; and spore germination and toxin production.

 ABSTRACTER: F. T. Piskur

9.6 PEST CONTROL
(Cross Ref.: 2.3)

Kilgore, W. W., and R. L. Doutt (eds.)
Pest Control (Academic Press, 111 Fifth Avenue, New York, N.Y. 10003) Price $19.50
Reviewed by G. F. Stewart
Food Technology 23, No. 4, 138-139 (April 1969)

This book is concerned largely with recent research and development on pest control and considers almost exclusively the insects and the vertebrates. Although the subject matter is not of practical use to technologists, it provides background information useful in relation to problems of food sanitation and safety.

9.6 HANDBOOK OF FOOD ADDITIVES
(Cross Ref.: 3.1)

Furia, T. E. (ed.)
Handbook of Food Additives, 750 pp. (1968) (CRC Press of the Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, Ohio 44128) Price $19.50
Reviewed by Karl O. Herz
Food Technology 23, No. 4, 139 (April 1969)

Fourteen types are treated by recognized experts: color additives, enzymes, vitamins and amino acids, antimicrobials, antioxidants, acidulants, sequesterants,

(over)

 ABSTRACTER: F. T. Piskur

9.6 IFIS--FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

Mann, E. J. (Commonwealth Bureau of Dairy Science and Technology, Shinfield, Reading, England)
Food Manufacture 44, No. 2, 47-51 (February 1969)

At the First International Congress of Food Science and Technology, Harvey and Mann presented a paper showing that abstracts of food-processing literature at that time were spread among 27 English language journals, with abstract quality and completeness of coverage within a specific field varying widely among the different journals. Some fields were not covered at all. Now the International Food Information Service (IFIS)--which was established in February 1968 with an agreement formally signed by the Commonwealth Agricultural Bureaux (United Kingdom), the Institut für Dokumentationswesen (Federal German Republic), and the Institute of Food Technologists (USA)--is publishing the monthly, Food Science and Technology Abstracts (FSTA). This article, which was written by the editor of FSTA, describes the history, development, and operations of IFIS and outlines the services the organization provides.

FSTA is available from the Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Slough, Buckinghamshire, England. The annual subscription price is $195.00.

[See Vol. 21, No. 11, p. 19 of Commercial Fisheries Abstracts for a description of the FSTA project.]

 ABSTRACTER: L. Baldwin

9.6
(Cross Ref.: 3.1)

gums, starches, surfactants, polyhydric alcohols, flavorings, potentiators, and nonnutritive sweeteners. In addition to the extensive bibliographies, the book also contains an 80-page listing of the regulatory status of direct food additives.

9.6 THE FREEZING PRESERVATION OF FOODS.
(Cross Ref.: 3.2) FACTORS AFFECTING QUALITY IN FROZEN FOODS

Tressler, D. K., W. B. Van Arsdel, and M. J. Copley (eds.)
The Freezing Preservation of Foods. vol. 2, 397 pp. (1968, Fourth edition) (Avi Publishing Co., P.O. Box 388, Westport, Connecticut 06880) Price $17.00; foreign $18.00

Reviewed by Norman E. Bednarcyk
Food Technology 23, No. 4, 139-140 (April 1969)

This volume contains a discussion of the basic phenomena and thermal properties that apply to freezing and thawing tissue; a description of quality changes, specific characteristics, and stability of all types of frozen food products from a basic food-source viewpoint; and an examination of nutritive value. The appendix contains various analytical methods for quality control and for research.

9.7 (Cross Reference: 0.9)

EFFECTING NATIONAL PRIORITIES FOR SCIENCE

Pitzer, Kenneth S.
Chemical and Engineering News 47, No. 17, 72-74 (April 21, 1969)

Business men and Congress are beginning to evaluate scientific and technological projects by the same criteria they use in making decisions about other matters--that is, are the returns commensurate with the costs. As a result, expenditures are leveling off, and, says the author, they should be. The time has now come for a reappraisal of goals as well as of products. Such a reappraisal must be in terms of humanistic values, not merely of economic desirability. The citizen, the Government, and the scientist must all participate actively in the evaluative process. [Abstracter: L. Baldwin]

9.19

west coast of The Netherlands; and sand eel (Ammodytes lanceolatus), tern (Sterna sandvicensis), and eider (Somateria mollissima) taken in the Wadden Sea area were used in the study. Egg extracts from the tern and eider, liver and brain tissues of Japanese quail, and three commercial PCB mixtures (phenochlor DP 6, arochlor 1260, and clophen A 60) were also used. Relative retention times (relative to dieldrin = 1), mass numbers, and the number of chlorine atoms per molecule were determined for each of the samples; mass spectra were taken from all the peaks in the total ion current chromatogram obtained with the double-ion source of the mass spectrometer.

The identity and pattern of PCBs with relative retention times of longer than 0.71 were markedly similar in the samples from the three areas. Therefore, since the water along the Dutch coast chiefly flows northward, the authors conclude that most of the PCB material in the fish and sea birds caught along the coast and in the Wadden Sea probably originated in the Rhine. Because the lower chlorinated PCBs occurred more frequently in the tissues of the roach than in those of the sea birds, they also conclude that the lower chlorinated PCBs are less persistent than the higher ones.

Although the mass numbers and the number of chlorine atoms per molecule indicated that most of the compounds found in the extracts were PCBs, other chlorinated compounds were also found; the fungicide HCB (hexachlorobenzene) and the insecticides DDE (1,1-dichloro-2,2-bis(p-chlorophenyl) ethene) and telodrin (1,3,-4,5,6,7,8,8-octachloro 1,3,3a,4,7,7a hexahydro-4,7-methano-isobenzofuran). Significantly, one PCB interfered with the determination of DDE. Thus, in addition to being hazards in their own right, PCBs are objectionable because they interfere with the detection of other compounds dangerous to fish and wildlife.
[2 figures, 2 tables, 12 references]

9.6 FISHING LITERATURE--
FISH AND PRODUCT NAMES IN FIFTEEN LANGUAGES

Anonymous
Multilingual Dictionary of Fish and Fish Products, 430 pp. Compiled by the Organization for Economic Co-operation and Development (Published by Fishing News (Books), Ltd., 110 Fleet Street, London, EC4, England) Price £7 10s (plus 5s postage)
Fishing News International 8, No. 2, 80 (February 1969)

The book contains a compilation of the names and descriptions of fish and fishery products produced throughout the world. It lists 1,117 items and is indexed in 15 languages. The book also includes an index of scientific names. For each item there are a description of the product and process and appropriate cross references to similar fish or products known by other names.
[Abstracter: F. T. Piskur]

9.6 (Cross References: 2.114, 2.118)

REFRIGERATION ON FISHING VESSELS

Merritt, J. H. (Engineering Section, Torry Research Station, Aberdeen, Scotland) Refrigeration on Fishing Vessels, 144 pp. (Published by Arthur J. Heighway Publications Ltd., Fishing News (Books) Ltd., 110 Fleet Street, London, E.C.4, England) Price £2 12s plus 2s postage and packing.

The book describes the principles and practices of refrigeration. Chapters are: Spoilage and Refrigeration, Icing, The Fishroom, Fishroom Insulation, Mechanical Refrigeration with Ice, Refrigerated Sea Water, Refrigeration Plant, Freezers, The Cold Store, and Freezing at Sea. [Abstracter: F. T. Piskur]

0.5 (Cross Reference: 2.01)

BACTERIAL SPORES: CHEMICAL SENSITIZATION TO HEAT

Alderton, Gordon, and Neva Snell (Western Regional Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Albany, California 94710)
Science 163, No. 3872, 1212-1213 (March 14, 1969)

Investigation of the heat resistance of bacterial spores has been predicated on the assumption that the resistance is innate and fixed. In mature spores, however, the heat-sensitive and the heat-resistant states are chemically reversible. Therefore such common practices as direct testing of spores for heat resistance without prior treatment, the general assignment of a logarithmic order of heat survival for spores, or the designation of single or narrow ranges of values for the heat resistance of species, strains, or even batches of spores are not appropriate. The authors report a new approach to lessening the severity of the heating required for a given degree of survivor reduction in low-acid spore-bearing substrates. The basis of the approach lies in the persistence of the heat-sensitive state when spores are suspended in natural biological mixtures in their ordinary pH range. With the approach, heating times for a given degree of survivor reduction can be decreased severalfold; moreover, since antimicrobial additives are not involved, the problems of the persistence, toxicity, and ecological effect of the additives are eliminated. [1 figure, 6 references]
[Abstracter: L. Baldwin]

1.85

A TEN-YEAR STUDY OF MEROPLANKTON IN NORTH CAROLINA ESTUARIES: CYCLES OF OCCURRENCE AMONG PENAEIDEAN SHRIMPS

Williams, Austin B. (University of North Carolina Institute of Marine Science, Morehead City, North Carolina 28557)
Chesapeake Science 10, No. 1, 36-47 (March 1969)

This paper discusses the occurrence of postlarval Penaeus species taken in samples from a series of estuarial stations in North Carolina during a 10-year-period starting January 1957. Analyses were made of annual cycles of occurrence and differences among years, stations, and species. In general, areas near the sea had the highest densities. Densities of postlarval Penaeus samples bore no relation to commercial catches of shrimp in North Carolina during the same years. [4 figures, 6 tables, 22 references] [Abstracter: F. T. Piskur]

1.013 (Cross Reference: 1.53)

INFORME PRELIMINAR SOBRE EL CRUCERO MERLUZA II, EFFECTUADO EN JULIO Y AGOSTO DE 1968 ENTRE LOS 30° L.S. Y 36°30′ L.S. [PRELIMINARY REPORT ON THE CRUISE OF THE MERLUZA II, MADE IN JULY AND AUGUST 1968 BETWEEN 30°00′ and 36°30′ S. Lat.]

Anonymous
IFOP Circular No. 29, 28 pp. (October 1968) (Instituto de Fomento Pesquero, Departamento de Recursos Naturales, Santiago, Chile) (In Spanish)

This report covers the second of a projected series of five cruises to be made to discover various aspects of the biology of Chilean hake (Merluccius gayi). A correlation of benthic and oceanographic data with the biological findings is necessary for an evaluation of the hake population.

In addition to data on hake, records were kept on shrimp, prawn, crab, whitefish, sea bream, flounder. ratfish, eel, dory, and pampano. [1 table, 16 charts]
[Abstracter: L. Baldwin]

2.3 DEEP FAT FRYING

Canadian Patent 805,560
Martin, J. T.
Marlinfri, Inc.
Food Technology 23, No. 4, 189 (April 1969)

Superheated oil is added to the oil [during the frying process] to counteract the drop in temperature resulting from the introduction of frozen foodstuffs.

2.3 FOOD BAR PRODUCTION

Japanese Patent 24939/68
Swift & Co.
Food Technology 23, No. 4, 189 (April 1969)

Emulsions of foodstuffs are cooked by passing them through a conduit heated by electricity.

1.013 (Cross Reference: 1.21)

(A) INFORME DEL CRUCERO NORTE III, REALIZADO EN COLABORACION CON LA INDUSTRIA PESQUERA EL 29 DE SEPTIEMBRE DE 1968 [REPORT OF THE THIRD NORTHERN CRUISE, UNDERTAKEN IN COLLABORATION WITH THE FISHING INDUSTRY, SEPTEMBER 29, 1968]

Anonymous
IFOP Circular No. 30, 15 pp. (October 1968) (Instituto de Fomento Pesquero, Santiago, Chile) (In Spanish)

(B) INFORME DEL CRUCERO NORTE IV, REALIZADO EN COLABORACION CON LA INDUSTRIA PESQUERA EL 27 OCTUBRE DE 1968 [REPORT OF THE FOURTH NORTHERN CRUISE, UNDERTAKEN IN COLLABORATION WITH THE FISHING INDUSTRY, OCTOBER 27, 1968]

Anonymous
IFOP Circular No. 31, 11 pp. (November 1968) (In Spanish)

These reports cover the third and fourth cruises made (1) to learn about the places of concentrated spawning of pelagic coastal species, especially of anchoveta, as well as the distribution and abundance of eggs and larva in relation to oceanographic conditions; and (2) to evaluate and predict the fishery resources along the coast of Chile from Arica to Mejillones. The program is being conducted by the IFOP's Department of Natural Resources in collaboration with the Chilean fishing industry.

The report on Cruise III contains 13 figures; the report on Cruise IV contains 10. [Abstracter: L. Baldwin]

0.5 (Cross Reference: 2.05)

BACTERIOPHAGES OF CLOSTRIDIUM BOTULINUM TYPES A, B, E, AND F AND NONTOXIGENIC STRAINS RESEMBLING TYPE E

Eklund, M. W., F. T. Poysky, and E. S. Boatman (Technological Laboratory, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, Seattle, Washington 98105)
Journal of Virology 3, No. 2, 270-274 (February 1969)

This paper presents observations on the occurrence of lysogenicity in Types A, B, E, and F and nontoxigenic strains resembling Type E of Clostridium botulinum. The authors report the first observations of bacteriophage from Type E, proteolytic and nonproteolytic Types B, and proteolytic Type F.
[12 figures, 2 references] [Abstracter: F. T. Piskur]

3,238 BUTTER PACKAGE

U.S. Patent 3,418,141
Orlado, T. W.
Procter & Gamble
Food Technology 23, No. 4, 189 (April 1969)

The package, designed for stick-type products, can be used as a serving dish.

2.117 NEED FOR FERRO-CEMENT BACKGROUND STRESSED -- 'NEW' MATERIAL HAS HISTORY OF FOES, PROBLEMS

Gardner, John
National Fisherman 49, No. 12, 4B, 22B (March 1969)

In the Foreword to "Ferro-Concrete Design and Fabrication, or Ol' Dan in the Lion's Den," by Raymond L. Waddell and Thomas W. Beckett (originally published in the August-September 1968 issue of Gam, address: Room 307, 29 Colborne Street, Toronto 1, Ontario, Canada), Mr. Gardner reiterates several of the words of caution directed by Waddell and Beckett toward would-be builders in ferro-cement. The use of chicken wire as reinforcing material is thoroughly disabused, for the steel elements are the prime contributors of structural strength--the concrete matrix is only a sealing membrane of great impermeability and plasticity; moreover, the reinforcing rods should never be welded to the pipe frame. The hull and deck should be poured quickly in one continuous operation; full-skin male-mold methods should not be used. A properly used air-entraining agent should be added to the concrete mix, and substantial temperature reinforcing should be incorporated to withstand extraordinary swings in temperature differential.

These and other controversial points among ferro-cement experts are touched upon. They dictate that, before starting his project, the builder should read every available source of information about the design and fabrication of ferro-cement vessels, accept nothing on faith, and check and recheck the credentials of "experts." The author lists Waddell's and Beckett's credentials and adds that their research into the background literature of the subject is probably the most thorough and comprehensive made up to now. Part I of their article is reprinted here. [3 photographs] [Abstracter: L. Baldwin]

1.87 (Cross References: 1.0114, 9.12)

OBSERVATIONS ON THE BIOLOGY AND BEHAVIOR OF THE CALIFORNIA SPINY LOBSTER, PANULIRUS INTERRUPTUS (RANDALL)

Mitchell, Charles T., Charles H. Turner, and Alec R. Strachan (Marine Resources Operations, California Department of Fish and Game)
California Fish and Game 55, No. 2, 121-131 (April 1969)

If the valuable fishery for California spiny lobster is to reach a maximum sustainable yield, the size of the population, its reproductive capacity, the annual recruitment and its availability to the fishery, the catch per unit of effort, and the animal's life history and behavior must be known. The data presented here were collected toward that end. Among the findings were the following: the lobsters molt once a year, in late summer or early fall, immediately after the reproductive cycle; females reach legal size (83 mm. in carapace length) in about 10 years, males in about 11; tail lengths of legal lobsters range from 157 to 267 mm. and weigh from 165 to 543 g.; regression data for carapace length on tail length, raw tail weight, and cooked tail weight revealed high coefficients of correlation--from 0.86 to 0.94; similar calculations for cooked tail weight on raw tail weight gave a 0.97 coefficient of correlation.
[9 figures, 1 table, 14 references] [Abstracter: L. Baldwin]

4.11 (Cross Reference: 7.591)

A MODIFIED COLORIMETRIC MICRO METHOD FOR LONG-CHAIN FATTY ACIDS AND ITS APPLICATION FOR ASSAY OF LIPOLYTIC ENZYMES

Mahadevan, S., C. J. Dillard, and A. L. Tappel (Department of Food Science and Technology, University of California, Davis 95616)
Analytical Biochemistry 27, No. 3, 387-396 (March 1969)

The Duncombe colorimetric (copper soap) method for the micro determination of free fatty acids (FFA) was modified by substituting diphenylcarbohydrazide for diethyldithiocarbamate as the color-complexing agent. This substitution increases the sensitivity of the method 4- to 6-fold. The absorbancy of the color that is produced is measured at 540 mμ. The authors describe the application of the method to the assay of pancreatic lipase and of rat-liver lysosomal lipase and phospholipase. [4 figures, 3 tables, 16 references]

[Abstracter: F. T. Piskur]

6.31 (Cross Reference: 7.591)

INTERTIDAL ZONATION OF MARINE ALGAE AT GLOUCESTER POINT, VIRGINIA

Wulff, Barry L., and Kenneth L. Webb (Virginia Institute of Marine Science, Gloucester Point, Virginia 23062)
Chesapeake Science 10, No. 1, 29-35 (March 1969)

This paper reports on the upper vertical limits of intertidal benthic marine algae found in the lower York River estuary near Gloucester Point, Virginia. Of the 26 benthic algal species found, more than 30 percent were limited to below mean low water, and 50 percent had ranges extending from mean low water or below to various intertidal heights. Six species not previously reported from Virginia were found. [4 figures, 17 references] [Abstracter: F. T. Piskur]

6.30 PREPARATION AND PROPERTIES OF THE PHYCOCOLLOID FROM HYPNEA MUSCIFORMIS FROM VERAVAL, GUJARAT COAST

Ramarao, K., and V. Krishnamurthy (Cent. Salt Mar. Chem. Res. Inst. Bhavnagar, India)
Chemical Abstracts 70, No. 3, 9339v (January 20, 1969)

6.54 RELATIVE UTILIZATION OF THE PROTEIN OF FISH PROTEIN CONCENTRATE AND OF CASEIN BY PROTEIN-DEPLETED RATS

Stillings, B. R., and Olivia A. Hammerle (Technological Laboratory, Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service, College Park, Maryland 20740)
Federation Proceedings 28, No. 2, 812, Item 3087 (March-April 1969)

The effectiveness of the protein supplied by fish protein concentrate (FPC) in promoting growth and in regenerating serum protein and serum albumin in malnourished animals was compared with that supplied by casein. Protein-deficient rats were fed diets with protein supplied either by FPC or by casein. In diets with 10 percent protein, FPC was more effective than casein in the growth promoted, the serum protein and serum albumin regenerated, and the protein efficiency ratio yielded. In diets with 20 percent protein, the effectiveness of the two protein sources was similar. [Abstracter: L. Baldwin]

6.54 FISH PASTE PRODUCT

Japanese Patent 24943/68
Daiichi Pharm. Co., Ltd.
Food Technology 23, No. 4, 148 (April 1969)

A fish paste is prepared by grinding raw fish meat with seed of Tamarindus indica Linn.

7.594 LIPID HELICES

Anonymous
Nature 221, No. 5187, 1198 (March 29, 1969)

Glauert and Lucy (1969) point out the great range of molecular assemblies, each apparently composed of globular lipid units arranged in different ways, that can be induced by negative staining with various heavy metals at different pHs. They conclude that electron microscopists should not rely on any one staining technique but should use a wide range of stains at varying pH; then the common denominators of the structural assemblies that are revealed should be sought. [1 internal reference] [Abstracter: L. Baldwin]

3.4 SMOKING FLUID

Canadian Patent 801,694
Fessman, G.
Food Technology 23, No. 4, 187 (April 1969)

Small particles of wood are exposed to superheated steam at temperatures higher than 180° C. The heat treatment decomposes the wood and forms a smoking fluid.

6.31 THE EFFECT OF LIGHT INTENSITY AND TEMPERATURE ON THE GROWTH OF SEVERAL MARINE ALGAE USEFUL FOR REARING MOLLUSCAN LARVAE

Yanase, Ryosuke, and Takeo Imai (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 19, No. 1, 75-82 (July 1968)

Marine algae are valuable as food for molluscan larvae and juveniles that are being raised for seed; therefore the growth conditions of four algae were studied. The optimum conditions for the growth of each are tabulated below.

Alga	Light intensity	Temperature
	Lux	° C.
Monochrysis lutheri	4,500-8,000	20-25
Platymonas sp.	4,500-8,000	23-25
Nitzschia closterium	4,500-12,500	23-29
Chaetoceros calcitrans	4,500-12,500	23

Chaetoceros grew very much faster under optimum conditions than the other three did. Thus this species seems to have an advantage for raising molluscan larvae on a large scale. [5 figures, 1 table, 14 references]

[Abstracter: L. Baldwin]

6.31 LES NOUVELLES METHODES DE RECOLTE ET LE REPEUPLEMENT DES CHAMPS DE LAMINAIRES [NEW METHODS OF HARVESTING AND RESTOCKING LAMINARIA AREAS]

Perez, R.
Science et Pêche, Bulletin d'Information et de Documentation No. 175, 7 pp. (November 1968) (L'Institut Scientifique et Technique des Pêches Maritimes, 59, avenue Raymond-Poincaré, Paris, France) (In French)

If divers who harvest Laminaria digitata would cut the alga at least 5 cm. from the top of the stipe, the plant could regenerate itself within 7 or 9 months. Dividing the area in which the alga grows into three sections and harvesting the sections in rotation on a 1-year-in-3 basis also facilities healthy regrowth.

[Abstracter: L. Baldwin]

7.80 A TABLE AND A SIMPLE PROCEDURE FOR FINDING LOT-AVERAGE DEVIATION FROM TARGET VALUE

Couden, H. N. (Safeway Brands Buying Division, Safeway Stores, Inc., P.O. Box 1168, Oakland, California 94604)
Food Technology 23, No. 4, 50, 52 (April 1969)

A procedure is described for testing against specified values. The purpose is to determine whether a lot average is plus or minus with respect to a specification or target value at a desired probability.

Two examples are given. [1 table, 1 reference] [Abstracter: F. T. Piskur]

6.54 COMPARISONS OF AN IN VITRO PEPSIN PROCEDURE AND IN VIVO METHODS FOR EVALUATING FISH FLOURS

Knipfel, J. E., H. G. Botting, and J. M. McLaughlan (Department of National Health and Welfare, Ottawa, Canada)
Federation Proceedings 28, No. 2, 811, Item 3077 (March-April 1969)

Rat growth, measurements of digestibility, plasma levels of lysine and methionine, fecal excretions of lysine and methionine, and a simple in vitro Dry Matter Digestibility procedure were used to determine the protein quality of fish protein concentrate. The growth assay data indicated that more than 4 hours of autoclaving is necessary to reduce protein quality significantly, whereas measurements of digestibility and increased fecal excretions of lysine and methionine indicated that nutritive value is reduced in less than 4 hours. Plasma levels of lysine and methionine, combined with growth, digestibility, and fecal excretion patterns, showed that at least 4 hours of autoclaving is necessary to reduce the availability of dietary methionine to a point where satisfactory growth will not be supported. The in vitro Dry Matter Digestibility procedure is considered a sensitive index of the protein quality of heated fish protein concentrate.

[Abstracter: L. Baldwin]

British Patent 1,132,151 and British Patent 1,132,152
Best Fertilizers Co.
Food Technology 23, No. 4, 189 (April 1969)

Meat and vegetables are stored and transported in containers that have been purged with nitrogen gas. The containers are purged with nitrogen at intervals to maintain a low oxygen content.

Japanese Patent 24933/68
Wada, Y.
Food Technology 23, No. 4, 189 (April 1969)

This gelatinized product contains tangle [edible seaweeds], starch, sodium alginate, amino acids, polyhydroxy saccharides, and salt.

British Patent 1,132,389
White Fish Authority; Herring Industry Board
Food Technology 23, No. 4, 148 (April 1969)

Food product is made by frying chips of dough containing raw or smoked fish and potato.

8.53 PHOSPHOLIPIDS OF MARINE INVERTEBRATES

Vaskovsky, V. E., and E. Y. Kostetsky (Institute of Biologically Active Substances, Siberian Department of the Academy of Sciences of the USSR, Vladivostok, U.S.S.R.)
Chemistry and Physics of Lipids 3, No. 1, 102-105 (January 1969) (North-Holland Publishing Company, P.O. Box 3489, Amsterdam, The Netherlands)

The paper reports on the qualitative and quantitative phospholipid composition of all main phyla of marine invertebrates. Data are given for 6 species of Spongia, 4 species of Coelenterata, 3 species of Vermes, 20 species of Mollusca, 4 species of Arthropoda, 10 species of Echinodermata, and 3 species of Chordata (Tunicata). Unusual phospholipids were found in a great number of invertebrates. No apparent correlation was found between the phospholipid composition and the taxonomic system of the marine animals. [1 table, 14 references]

[Abstracter: F. T. Piskur]

9.12 (Cross Reference: 1.87)

A STUDY OF LOBSTER (HOMARUS AMERICANUS) ECOLOGY USING SERUM PROTEIN CONCENTRATION AS AN INDEX

Stewart, James E., and M. F. Li (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia)
Canadian Journal of Zoology 47, No. 1, 21-28 (1969) (National Research Council of Canada)

Previous work has shown that the serum protein concentration of the hemolymph of lobster was a valid index of the amount of muscle in the live lobster and that the measurement provided a rapid nondestructive determination of the physical condition of the animal. Serum protein measurements were made of more than 1,000 adult lobsters captured from widely separated locations along the Canadian Atlantic littoral. Analysis of the values indicated the extent of the variation in the physical condition of the lobster from one area to another and from one season to another, and aided in fixing the time of molting. Thus, the measurement of the serum protein allows a rapid determination of the physical condition of the living lobster and could aid in the monitoring of lobster fishing grounds to detect changes in the environment and to assist in implementing management practices. [3 figures, 2 tables, 27 references]

[Abstracter: F. T. Piskur]

9.16 (Cross References: 1.81, 9.13)

CHANGES OF OXYGEN CONSUMPTION AND RESPIRATORY QUOTIENT IN THE TISSUES OF OYSTERS DURING THE STAGES OF SEXUAL MATURATION AND SPAWNING

Mori, Katsuyoshi (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 19, No. 2, 136-143 (August 1968)

Galtsoff (1964) found that the respiratory quotient in the American oyster, Crassostrea virginica, varied from 0.51 to 1.44 throughout the year and that there was no definite trend in the variation. The present author, following the seasonal changes of oxygen consumption and respiratory quotient in the tissues of the Japanese oyster (Crassostrea gigas), found that the respiratory rate in the digestive diverticula ≥gills>pallial margin; the rate in the tissues of oysters that matured rapidly and had a relatively long spawning period decreased markedly during the spawning period. The respiratory quotient of the gills was about 1.0 as a rule; that of the digestive diverticula and the pallial margin varied markedly with the season, being inversely related during the rapid stages of sexual maturation. The seasonal relation between oxygen consumption and the respiratory quotient indicates that carbohydrates are a more efficient energy source than fats. [4 figures, 1 table, 16 references]

[Abstracter: L. Baldwin]

9.19 NITRIFICATION: IMPORTANCE TO NUTRIENT LOSSES FROM A CUTOVER FORESTED ECOSYSTEM

Likens, Gene E. (Department of Biological Sciences, Dartmouth College, Hanover, New Hampshire 03755), F. H. Bormann (School of Forestry, Yale University, New Haven, Connecticut 06520), and Noye M. Johnson (Department of Earth Sciences, Dartmouth College)
Science 163, No. 3872, 1205-1206 (March 14, 1969)

The average weighted concentration of nitrate in the drainage water from an experimental forest in central New Hampshire was measured at 0.9 mg. per liter. Two years after the hardwood vegetation had been removed, the concentration had increased to 53 mg. per liter. This nitrate mobilization was probably caused by an increase in microbial nitrification, despite the decrease in the pH of the stream water to a weighted average of 4.3; it was equal to all the other net cationic increases and anionic decreases in the drainage water. [2 tables, 15 references]

[Abstracter: L. Baldwin]

9.14 NUTRITIONIST REVIEWS WORK ON CATFISH STOCKING RATES, NUTRITION, MANAGEMENT

Anonymous
Feedstuffs 41, No. 14, 20-21 (April 5, 1969)

This article is a resumé of reports given by W. H. Hastings (Fish Farming Experimental Station, Stuttgart, Arkansas) at meetings on fish farming held in Georgia and Louisiana. He points out that the fish farmer attains the optimum stocking rate for raising food-sized catfish when he stocks to the limit of population density without creating conditions of stress, inefficient feed conversion, and decreased final weight in the fish. The optimum stocking rate is governed by the carrying capacity of the water in the pond, which, in turn, is affected by the water chemistry and the pond ecology. Optimum growth is affected by the feed given the fish as well as by the stocking rate. Feed formulas must be planned not only with nutritional requirements in mind but with such other factors as digestibility, acceptability, and cost in mind. The goal is a product of optimum dressed weight for the least cost of production.
[3 tables] [Abstracter: L. Baldwin]

9.6 (Cross Reference: 1.0111)

INDEX AND LIST OF TITLES, FISHERIES RESEARCH BOARD OF CANADA AND ASSOCIATED PUBLICATIONS 1900-1964

Carter, Neal M.
Fisheries Research Board of Canada, Bulletin 164, 649 pp. (1968) (Queen's Printer, Ottawa, Canada) Price (Can.) $1.00

The compilation expands and updates an earlier Index and List of Fisheries Research Board of Canada Publications. It brings together a list of and an index to all Fisheries Research Board publications up to and including 1964. In addition, it includes a compilation and index of 1,416 articles that were published over the same years but which were not previously recorded or indexed in Fisheries Research Board lists. [Abstracter: F. T. Piskur]

8.8 (Cross References: 6.55, 7.86)

SALMONELLAE IN POULTRY FEEDS

Zindel, H. C., and M. V. Bennett (Department of Poultry Science and Department of Veterinary Clinics, Michigan State University, East Lansing 48823)
Poultry Science 47, No. 6, 1925-1928 (November 1968)

The purpose of this study was to determine the incidence of Salmonellae in poultry feed ingredients used by the Poultry Science Research Unit, Michigan State University at East Lansing and at Chatham. The samples of finished feeds came from four commercial feed mills. Samples of feed and feed ingredients were tested. Samples were collected in 1-pound quantities.

A total of 808 samples was examined and Salmonellae were found in 13 (1.6 percent). Salmonellae were not isolated from pelleted or extruded feeds. The low percentage of contaminated feeds found in this study may be a reflection of the extremely small samples taken. [2 tables, 10 references]
[Abstracter: F. T. Piskur]

9.16 (Cross References: 1.35, 9.125)

SALT WATER AND FRESH WATER POND REARING OF THE CHUM SALMON, ONCORHYNCHUS KETA (WALBAUM)

Sato, Ryuhei, and Masaaki Kashiwagi (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 19, No. 2, 127-135 (August 1968)

The comparative growth, survival rate, and blood characteristics of salmon raised in fresh and in salt water under controlled food and water conditions are tabulated below.

Test group and conditions	Age of fish	Length (Avg.)	Weight (Avg.)	Cumulative mortality	Water content of blood	Freezing point depression of blood
	Year	mm.	g.	Percent	Percent	Δ (-° C.)
Chum salmon fry held in fresh-water (below 19° C.)	1	182	83	9	84.9	
	2	237	242	45	86.9	0.71
	3	398 1/	410 1/	98	94.7	0.46
Chum salmon fry held in salt water (below 19° C.)	1	255	220	75 2/	87.9	0.83
	2	397	962	--	77.8	0.68
	3	530	1,950	--	81.3	0.73

1/ Most fish had died of dropsylike disease.
2/ Fry were infected with a bacterial disease. [7 figures, 1 table, 4 references]

Author	Page	Code
Alderton, Gordon	21	0.5
Allain, Ch.	5	1.120
Aloncle, H.	5	1.120
Anderson, J. O.	13	6.195
	13	6.195
Baker, E. G.	18	9.16
Ball, C. Olin	11	3.337
Battistamartinenghi, G. (pat.)	14	6.135
Beasley, Thomas M.	17	9.19
Benford, Harry	8	2.117
Bennett, M. V.	26	8.8
Bergdoll, Merlin S.	4	0.7
Boatman, E. S.	22	0.5
Bonn, Warren E.	8	2.117
Bonnet, M.	8	2.12
Borden, Hal	17	9.16
Bormann, F. H.	25	9.19
Botting, H. G.	24	6.54
Braaten, Duane O.	16	9.1
Brandl, Karl	8	2.117
Brandlmayr, John	7	2.117
	8	2.117
Broad, R. L., Jr. (pat.)	12	3.27
Brunn, R. A. (pat.)	4	0.6
Buswell, E. E.	7	2.117
Campbell, Robert A.	8	2.117
Carter, Neal M.	26	9.6
Chappelle, Howard I.	7	2.117
Clemens, Harold B.	6	1.122
Cobb, Boughton, Jr.	7	2.117
Cohen, Carolyn	16	7.51
Collins, Robson A.	10	1.21
Copley, M. J. (ed.)	20	9.6
Couden, H. N.	24	7.80
Crawford, Ladell	5	2.118
Daly, John J., Jr.	5	2.118
Deluca, H. F.	13	4.91
Dennis, J. M. (pat.)	10	2.2
De Vos, R. H.	19	9.19
Dillard, C. J.	23	4.11
Dingle, J. T.	3	0.7
Doutt, R. L. (ed.)	19	9.6
Edington, J. M.	17	9.17
Eisenhauer, D. A.	7	2.117
Eklund, M. W.	22	0.5
Ellis, Ian E.	9	2.12
Farkas, D. F.	3	0.8
Felszegi, George W.	7	2.117
Fessman, G. (pat.)	23	3.4
Finch, Roland	5	2.118
Flittner, Glenn A.	6	1.122
Fraser, D. J.	8	2.117
Frontini, E. J.	7	2.117
Frye, John	5	1.84
Furia, T. E. (ed.)	19	9.6
Gardner, John	6	2.117
	22	2.117
Gray, J. R. A.	17	9.17
Griffin, Roger C., Jr.	11	3.337
Gulbrandsen, Øyvind	7	2.117
Hagenbach, T. M.	8	2.117
Hammerle, Olivia	23	6.54
Hall, A. J.	3	0.7
Harris, M. I.	11	3.25
Hearing, Vincent J.	2	0.38
Herbert, R. H.	12	3.231
Herndon, David H.	11	3.337
High, William L.	9	2.12
Hilker, D. M.	14	5.2
Hines, W. S.	7	2.117
Hopkins, W. A.	8	2.117
Hughes-Adams, G.	7	2.117
Imai, Takeo	24	6.31
Ingram, M. (ed.)	19	9.6
Iqbal, M.	3	0.7
Jamieson, G. R.	13	4.11
Jansen, G. R.	15	6.54
Johnson, Noye M.	25	9.19
Jones, Yvonne M.	17	9.19
Kashiwagi, Masaaki	17	9.125
	26	9.16
Kelly, A. M.	8	2.117
Kendrick-Jones, John	16	7.51
Kern, Martin	11	3.26
Kilgore, W. W. (ed.)	19	9.6
Knipfel, J. E.	24	6.54
Koeman, J. H.	19	9.19
Kojima, Seitaro	7	2.117
Kostetsky, E. Y.	25	8.53
Kotin, Paul	4	0.7
Krishnamurthy, V.	23	6.30
Lazar, M. E.	3	0.8
Lee, Y. C.	15	7.599
Lenz, Robert W.	1	0.3
Levine, Robert S.	8	2.117
Li, M. F.	25	9.12
Likens, Gene E.	25	9.19
Lin, K. H.	1	0.3
Lippay, Alex	8	2.117
Lloyd, Anthony M. (pat.)	14	6.133
Longley, William	16	7.51
Lugiewicz, R. C. (pat.)	10	2.3
Lusz, Larry D.	9	2.12
Magee, P. N.	1	0.4
Mahadevan, S.	23	4.11
Mann, E. J.	19	9.7
Martin, J. T. (pat.)	21	2.3
Mathews, S. T.	8	2.117
Matsumoto, I. M.	8	2.117
Maurin, Cl.	8	2.12
McArthur, Robt.	8	2.117
McInnis, Walter J.	7	2.117
McLaughlan, J. M.	24	6.54
McLoughlin, J. V.	4	0.39
Merritt, J. H.	20	9.6
Meusel, J. A. (pat.)	4	0.6
Millard, D.	3	0.7
Milne, W. J.	8	2.117
Mitchell, Charles T.	22	1.87
Moore, J. L.	13	4.91
Moore, T.	3	0.7
Mori, Katsuyoshi	25	9.16
Mouat, T. W.	8	2.117
Muir, L.	15	7.599
Murphy, Gordon D.	11	3.26
Nelson, Richard I.	7	2.117
Orlado, T. W. (pat.)	22	3.238
Osterberg, Charles L.	17	9.19
Payne, William W.	4	0.7
Pelmulder, J. P. (pat.)	12	3.2342
Perez, R.	24	6.31
Peter, O.	14	5.2
Pike, D. S.	7	2.117
Pitzer, Kenneth S.	20	9.7
Potter, Stanley	7	2.117
Poysky, F. T.	22	0.5
Pullen, Edward J.	15	9.11
Ramarao, K.	23	6.30
Reid, E. H.	13	4.11
Reigle, Norman J., Jr.	7	2.12
Richardson, T.	13	4.91
Roberts, T. A. (ed.)	19	9.6
Robinson, Peg	5	1.84
	17	9.16
Rockwell, W. C.	3	0.8
Roels, Oswald A.	3	0.6
Rosen, Baruch	9	2.3
Rosseman, M. (pat.)	10	2.2
Saethre, J.	8	2.117
Samson, John	8	2.117
Sato, Ryuhei	17	9.125
	26	9.16
Schmidt, P. J.	18	9.16
Scocca, Jane R.	15	7.599
Scott, James Michael	5	1.12
Sharman, I. M.	3	0.7
Skrmetta, C. B. (pat.)	10	2.3
Skrmetta, R. Q. (pat.)	10	2.3
Snell, Neva	21	0.5
Spaulding, K. B., Jr.	7	2.117
Stewart, James E.	25	9.12
Stillings, B. R.	23	6.54
Storry, J. E.	3	0.7
Strachan, Alec R.	22	1.87
Svenkerud, H.	8	2.117
Swann, P. F.	1	0.4
	1	0.4
Szent-Györgyi, Andrew G.	16	7.51
Tappel, A. L.	23	4.11
Tatro, Mahlon C.	9	2.3
	9	2.3
	10	2.3
Ten Noever de Brauw, M. C.	19	9.19
Thuse, E. (pat.)	12	3.2342
Tietze, Frank	15	7.51
Traung, Jan-Olof	7	2.117
Tressler, D. K. (ed.)	20	9.6
Tuckley, B.	3	0.7
Turner, Charles H.	22	1.87
Van Arsdel, W. B. (ed.)	20	9.6
Vaskovsky, V. E.	25	8.53
Wada, Y. (pat.)	24	6.37
Ward, Janice F.	9	2.3
	9	2.3
Ward, Janice W.	9	2.3
Warnick, R. E.	13	6.195
	13	6.195
Waters, Mike	8	2.117
Webb, Kenneth L.	23	6.31
Whitehead, R. C., Jr. (pat.)	16	7.53
Williams, Austin B.	21	1.85
Wisutharom, K.	13	6.195
Wood, Richard	10	1.21
Wulff, Barry L.	23	6.31
Yanase, Ryosuke	24	6.31
Yeatman, Martin	7	2.117
Young, Alan W.	11	3.26
Zindel, H. C.	26	8.8

Abbreviations used: ed., editor
pat., patentee

Subject	Page No.	Code No.
ANALYSIS, ORGANIC		
The Analysis of Oils and Fats by Gas Chromatography. VI - Calculation of Equivalent Chain Length and Modified Equivalent Chain Length Values	13	4.11
Enzymic Method for Quantitative Determination of Nanogram Amounts of Total and Oxidized Glutathione: Applications to Mammalian Blood and Other Tissues	15	7.51
Rapid Automatic Analysis of Sugar Componencs in Glycoproteins. 1. Hexosamines	15	7.599
Paramyosin: Molecular Length and Assembly	16	7.51
A Modified Colorimetric Micro Method for Long-Chain Fatty Acids and Its Application for Assay of Lipolytic Enzymes	23	4.11
Lipid Helices	23	7.594
BACTERIOLOGY		
Bacterial Spores: Chemical Sensitization to Heat	21	0.5
Bacteriophages of Clostridium botulinum Types A, B, E, and F and Nontoxigenic Strains Resembling Type E	22	0.5
AUTHOR INDEX	27	
CANNED FISH, PROCESSING		
Use of Computer-Derived Tables to Calculate Sterilizing Processes for Packaged Foods. 2. Application to Broken-Line Heating Curves	11	3.337
CHEMISTRY AND BIOCHEMISTRY, MISCELLANEOUS		
Applied Reaction Kinetics. Fundamentals and Applications	1	0.3
Applied Reaction Kinetics. Polymerization Reaction Kinetics	1	0.3
Nitrosamine-Induced Carcinogenesis--the Alkylation of Nucleic Acids of the Rat by N-Methyl-N-Nitrosourea, Dimethyl-Nitrosamine, Dimethyl Sulphate and Methyl Methanesulphonate	1	0.4
The Rate of Breakdown of Methyl Methanesulphonate, Dimethyl Sulphate and N-Methyl-N-Nitrosourea in the Rat	1	0.4
Demonstration of Acid Phosphatase Activity in the Granules of the Blood Cells of the Lobster, Homarus americanus	2	0.38
COMPOSITION, ORGANIC		
Phospholipids of Marine Invertebrates	25	8.53
CONSERVATION		
Effect of Woodland Clearance on Stream Temperature	17	9.17
EXPLORATORY FISHING		
Bottom Trawl Explorations in Lake Superior, 1963-65	7	2.12
Trawling Along the Northwest Coast of Africa. Results of Voyages of the "Thalassa"	8	2.12
A Progress Report on the Development of a Shrimp Trawl to Separate Shrimp From Fish and Bottom-Dwelling Animals	9	2.12
FACTORYSHIPS		
Rapid Freezing of Tuna by Immersion in Dichlorodifluoromethane	5	2.118
FISH MEAL, NUTRITIVE VALUE		
Available Amino Acids in Poultry Feedstuffs	13	6.195
Relation Between the Available Essential Amino Acid Patterns in Four Fish Meals and Their Values in Certain Broiler Rations	13	6.195
FISH CULTURE		
Florida Shrimp Farm Near Commercial Stage "Lease for Large Bay		

Subject	Page No.	Code No.
Intertidal Zonation of Marine Algae at Gloucester Point, Virginia	23	6.31
The Effect or Light Intensity and Temperature on the Growth of Several Marine Algae Useful for Rearing Molluscan Larvae	24	6.31
New Methods of Harvesting and Restocking Laminaria Areas	24	6.31
MARKETING		
Private Label	11	3.26
Private Label	11	3.26
NUTRITION AND MEDICINE, GENERAL		
The Effects of Intravenous Infusions of Cod-Liver and Soya-Bean Oils on the Secretion of Milk Fat in the Cow	3	0.7
Nutrition and Lysosomal Activity. The Effect of Dietary Cod-Liver Oil on the Distribution of Polyunsaturated Fatty Acids in the Kidney Lysosomes of Rats Receiving Deficient or Adequate Intakes of Vitamin E	3	0.7
NUTRITIONAL VALUE OF FISHERY BYPRODUCTS OTHER THAN MEAL		
Total Protein Value of Protein -- and Amino Acid-Supplemented Bread	15	6.54
OCEANOGRAPHY		
Hydrological Conditions in Clear Lake, Texas, 1958-66	15	9.11
OILS, NUTRITION		
Essential Fatty Acids and Ionic Permeability of Lecithin Membranes	13	4.91
PATENTS		
Emulsion Color Development	4	0.6
Bivalve Processing	10	2.2
Meat Packing Apparatus	10	2.3
Shrimp Processing	10	2.3
Immersion Freezing Equipment	12	3.2342
Freeze Thaw Indicator	12	3.27
Solvent Extraction of Fatty Acids	14	6.133
Fat Deodorization	14	6.135
Refining Heads Oils of Whales	14	6.137
Potato Chip Product	16	6.54
Fat Measurement	16	7.53
Deep Fat Frying	21	2.3
Food Bar Production	21	2.3
Butter Package	22	3.238
Smoking Fluid	23	3.4
Fish Paste Product	23	6.54
Preservation Process	24	3.13
Processed Tangle Product	24	6.37
Fish Product	24	6.54
PERIODICALS AND BOOKS		
Botulism	19	9.6
Handbook of Food Additives	19	9.6
Pest Control	19	9.6
Fishing Literature-- Fish and Product Names in Fifteen Language	20	9.6
The Freezing Preservation of Foods	20	9.6
IFIS--Food Science and Technology Abstracts	20	9.6

Area Seen as Last Major Hurdle"; "Marine Experts Endorse Akima Farming Project" 17 9.16
Indirect Pigmentation of Salmon and Trout Flesh With Canthaxanthin 18 9.16
Nutritionist Reviews Work on Catfish Stocking Rates, Nutrition, Management 26 9.14

FISH PROTEIN CONCENTRATE
Relative Utilization of the Protein of Fish Protein Concentrate and of Casein by Protein-Depleted Rats 23 6.54
Comparisons of an in vitro Pepsin Procedure and in vivo Methods for Evaluating Fish Flour 24 6.54

FISHERY EDUCATION
Effecting National Priorities for Science 20 9.7

FOOD TECHNOLOGY
Marine Proteins 3 0.6
A Rotating Hydrostatic Helix for Transferring Solid-Liquid Mixtures Under Pressure or Vacuum 3 0.8
Relationship Between Muscle Biochemistry and Properties of Fresh and Processed Meats 4 0.39

FROZEN FISH, PROCESSING
Freon Freezer to Compete Directly With IQF [Individually Quick Frozen] Vegetables, Fruit Systems 9 3.231
An Engineer's Guide to Cold Store Practice. 14--Heating Mats and Pipe Tracing (1) Design 12 3.231

HANDLING FRESH FISH
The Effect of Cleaning Procedures on the Quality Attributes of the Maryland Soft Shell Clam (Mya arenaria). I - Effect of Blowing on Sand, Shell, and Absorbed Water 9 2.3
II - Bacteriological Studies 9 2.3
III - Pilot Plant Studies 9 2.3

HERRING AND SIMILAR SPECIES
First Report of Anchovy Tagging in California 10 1.21

ICHTHYOLOGY
Robustness of the DeLury Population Estimator 16 9.1
A Comparison of Some Blood Properties Between the Two Groups of Chum Salmon, Oncorhynchus keta (Walbaum), Reared in a Salt Water Pond and in a Fresh Water Pond 17 9.125
A Study of Lobster (Homarus americanus) Ecology Using Serum Protein Concentration as an Index 25 9.12
Changes of Oxygen Consumption and Respiratory Quotient in the Tissues of Oysters During the Stages of Sexual Maturation and Spawning 25 9.16
Salt Water and Fresh Water Pond Rearing of the Chum Salmon, Oncorhynchus keta (Walbaum) 26 9.16

LOBSTER
Observations on the Biology and Behavior of the California Spiny Lobster, Panulirus interruptus (Randall) 22 1.87

MARINE PLANT PRODUCTS
Preparation and Properties of the Phycocolloid from Hypnea musciformis from Veraval, Gujarat Coast 23 6.30

Index and List of Titles, Fisheries Research Board of Canada and Associated Publications 1900-1964 26 9.6
Refrigeration on Fishing Vessels 20 9.6

POLLUTION
Natural and Artificial Radionuclides in Seafoods and Marine Protein Concentrates 17 9.19
Chlorinated Biphenyls in Fish, Mussels and Birds From the River Rhine and the Netherlands Coastal Area 19 9.19
Nitrification: Importance to Nutrient Losses From a Cutover Forested Ecosystem 25 9.19

PRESERVATION AND SANITATION
Symposium Protecting Our Foods From Environmental Intrusion. 1. Microbial and Chemical Hazards in Foods. 2. Bacterial Toxins in Food 4 0.7
Salmonellae in Poultry Feeds 26 8.8

QUALITY CONTROL
A Table and a Simple Procedure for Finding Lot-Average Deviation From Target Value 24 7.80

SHELLFISH AND CRUSTACEANS, MISCELLANEOUS
Methods Developed to Handle Calico Scallops 5 1.84

SHRIMP
A Ten-Year Study of Meroplankton in North Carolina Estuaries: Cycles of Occurrence Among Penaeidean Shrimps 21 1.85

SOUTH AMERICAN FISHERIES
Preliminary Report on the Cruise of the Merluza II, Made in July and August 1968 Between 30°00' S. and 36°30' S. Lat. 21 1.013
Report of the Third Northern Cruise, Undertaken in Collaboration With the Fishing Industry, September 29, 1968; Report of the Fourth Northern Cruise, Undertaken in Collaboration With the Fishing Industry, October 27, 1968 22 1.013

TRANSPORTATION
Liquid Nitrogen for Food Transportation 11 3.25

TUNA
Tuna Schooling Terminology 5 1.12
Migrations of Albacore as a Function of Thermal Variations in the Environment Between the Portuguese Sector and the Southwest of Ireland. Voyages of The Pelagia and the Thalassa From May 18 to September 30, 1968 5 1.120
Bluefin Tuna Migrate Across the Pacific Ocean 6 1.122

VESSELS, FISHING
Technical Editor Comments on Readers' Letters Ranging From Trunnels to Ferro-Cement 6 2.117
Conference on Fishing Vessel Construction Materials. Hull--Deck--Superstructure 7 2.117
Need for Ferro-Cement Background Stressed -- 'New' Material Has History of Foes, Problems 22 2.117

VITAMINS, B-COMPLEX, MISCELLANEOUS
Antithiamine Factor(s) in Tissue of Tuna and Goatfish 14 5.2

GPO 995-940

UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WIDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
DIVISION OF PUBLICATIONS
BLDG. 67, U.S. NAVAL AIR STATION
SEATTLE, WASHINGTON 98115

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States — now and in the future.